TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 19.] 1922. [No. 2.

MALARIA: A CRITICAL REVIEW.

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The Great War produced a veritable flood of malarial literature, consequent on the introduction to the disease of many new workers whose chief asset was keenness. This output was not, in the main, of exaggerated value. On the other hand the war afforded to experts new experiences and new angles of view, of which ready opportunity was taken.

A consideration of the diversity of conclusions drawn from personal observations leaves the impression that much of the contradictory opinion held on malaria is due to a provincialism which it is clearly one of the main functions of this *Bulletin* to combat, and which results in the basing of world-wide conclusions on a geographically restricted experience. Unquestionably the general lines of the life-histories of the malarial parasites and of their insect hosts are uniform; yet details vary locally, and indeed in the same locality from time to time. If a mosquito species has been shown to exhibit in one locality enjoyment of a particular habitat, preference for a particular host, and limitation for oviposition to collections of water of a particular kind, there will be no necessary control of malaria in another locality, served for infection purposes by the same mosquito, should the sanitarian limit his activities to the procedures which were successful in the first (vol. 17, p. 130).

The Species of Malarial Parasites.

There is still no complete agreement as to whether there are several stable or one polymorphic species of malarial parasite. The morphology of the various forms has been dealt with by PRATT JOHNSON (vol. 17, p. 296), ACTON (vol. 18, p. 335), CRAIG and others, and there is no need to recapitulate them; except possibly to point out that ACTON's coloured plates are particularly valuable, and that CRAIG holds that there are two species of the malignant parasite, a quotidian and a tertian (vol. 18, p. 93). ACTON, too, insists that it is not merely in morphology that these various forms differ, but in cultural characteristics, incubation periods, symptomatology—in which presumably he includes the asexual life-history of the parasite—and, as he believes,

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in their reactions to quinine. Moreover, as MAYNE says (vol. 17, p. 295), "If one carefully analyses the accounts in the literature of approximately one hundred mosquito experiments an incontrovertible fact presents itself. In every instance of positive result the type of parasite imbibed with the blood of the donor was always reproduced with regularity in the volunteer host."

Such considerations might well be held conclusive of a multiplicity of species, but there are those who say "No." For instance, CREMONESE, as the abstract runs (vol. 15, p. 401), "assumes that the Anopheles which appear in April and May are few and do not bite; therefore the benign tertian agues at that time are due to infections in the previous autumn; therefore the *Plasmodium falciparum* must change into *P. vivax* with the season." Similarly GRASSI (vol. 17, p. 293), struck by finding, in a family of seven, six infections within a week, three with benign and three with malignant tertian malaria, points out that while in July–August the proportion of the two forms is 92 to 64, in September it is 11 to 107. Assuming that these forms represent two species of parasite, the proportions, in his estimation, ought not to have reversed themselves—partly because more mosquitoes must have been infected earlier with benign than with malignant forms, and partly because crescents are so rare from April to August that the autumn epidemic could not have been caused by them. He concludes that there is one parasitic species, reappearing regularly in the same form at each relapse, except that in March and April the malignant tertian form relapses as benign tertian and that in prolonged infestation the form is likely to change. Again, PLEHN (vol. 15, p. 248), in advocating the unicity of species, holds that the large benign forms acquire in mosquitoes, under the action of summer heat, the property of destroying the erythrocytes before full stature is reached and of producing crescents. Assuming, quite incorrectly, that the small malignant forms occur exclusively in tropical climates, he points out that infected mosquitoes live there throughout the year at a uniformly high temperature.

These three lines of assumption (they are not lines of reasoning) based on local experiences, yet imply, on consideration, one further assumption, namely, that an infection, when present, can infallibly be detected by an examination of the blood. In this matter the work of RENNIE, ACTON, CURJEL and DEWEY (vol. 18, p. 335) is pertinent. Their skill cannot be questioned, and yet they, working at Dagshai, in climatic conditions under which primary infection was unknown and reinfection accordingly, for practical purposes, dismissible, record (to take one only of their several series) 564 negative examinations in 82 persons in whose blood the benign tertian parasite subsequently appeared. It is perhaps not widely appreciated how uncertain diagnosis by the ordinary thin film may be. That this is so is suggested by the recent advocacy of so-called provocative measures, a long list of which SASSEN has compiled (vol. 14, p. 271), and which are intended to throw the parasites into the peripheral blood in sufficient numbers for ready detection. ROSS's thick-drop method has the same aim, and evidence of its success is furnished by TAYLOR (vol. 11, p. 36), who examined a thick and a thin film from each of many patients. Of these, 526 thick films, examined for a maximum of five minutes, were positive. Of the corresponding thin films, examined for a maximum of thirty minutes, only 125 were positive. Again the doubt that overhung the first three days of Dr. MANSON's classical inoculation experiment will come to the memory in this connection.

If it be impossible to state from an ordinary blood examination that malarial infection is certainly absent, it is equally impossible, when one form of parasite has been detected, to state that the infection is necessarily a pure one. This is no theory. ACTON, RENNIE, CURJEL and DEWEY found that of 102 cases whose medical history sheets showed that they had harboured crescents, 64 suffered in Dagshai from benign tertian relapses. Indeed it seems a particularly courageous assumption to conclude, when one form displaces another in the peripheral blood, that this is due to anything more than an imperfect diagnosis. With the unicity theory requiring so much assumption, most readers are likely to agree with "conservative scientific opinion" that to explain and to explain away have sometimes unhappy resemblances.

Life-History.

The stereotyped life-history is not unquestioningly accepted. HENSZELMAN (vol. 14, p. 272), seeing what others interpret as the fortuitous combination of a gametocyte and a sporont in a single erythrocyte, pronounced it to be an instance of sporulation of a gametocyte. ALCOCK's comment in abstracting a paper by THOMSON (vol. 11, p. 1) cannot be bettered. "In postulating the reversion of a gamete into a schizont—the gamete always being a peculiarly-determined and highly differentiated cell—SCHAUDINN invoked a phenomenon which, so far as is known, is unparalleled in biology." WENYON * is equally against SCHAUDINN's views.

LAWSON's view (vol. 15, p. 419) that the malarial parasite, even the crescent, flits, so to speak, from erythrocyte to erythrocyte, culling the haemoglobin from each as the bee culls honey from a flower, is not accepted.

Insufficient experience has led to expression of the view, which is contrary to fact, that gametocytes only appear after the administration of quinine. Since the gametocyte is the sexual stage and the mosquito the definitive host (that in which the sexual process takes place) this belief implies that man has created the most important biological phase in the creature's life-history. Man is rarely at his best when he assumes the god, affects to nod, and seems to shake the spheres.

ACTON, in April, 1919 (vol. 18, p. 335), wrote that natural cure results from the exhaustion of the asexual cycle by its conversion into gametes, which are destroyed by phagocytes or die of senility. The steps of the argument have, however, not yet been published. BLACKLOCK's careful report (vol. 18, p. 332) on the recent fatal case of *P. falciparum* infection contracted in or about Liverpool suggests that the optimum habitats of the sexual and asexual forms differ, that for the gametocyte being in the bone marrow and that for the segmenting forms in the spleen. Much of the existing diagnostic confusion results from the belief that the optimum habitat is the blood. In *A. maculipennis* (ROUBAUD, vol. 13, p. 63) the feebly refractile oocysts of *P. vivax*, with their fine granules of grey pigment in loose chainlets, give rise to mature sporozoits in 11 days at 25° C. and in 15 days at 15°–23° C., while the strongly refractile oocysts of *P. falciparum*, with their large granules of black pigment, reach the

* Where WENYON is quoted without reference to the *Bulletin* the originals will be found in the *Jl. Royal Army Med. Corps.*, 1921, vol. 37, nos. 3, 4 & 5.

same stage in 14 days at 25° C. and in 20 days at 15°–23° C. WENYON's experiments with *A. maculipennis* gave similar results; with *A. superpictus* both parasites developed with equal readiness. It must not be assumed, however, that gametes have merely to enter a favourable mosquito host for sexual union to occur. MITZMAIN (vol. 11, p. 32) reports the finding of large numbers of crescents in Anopheline dejecta, a possible explanation of WENYON's observation that different Anopheles females fed on the same person develop very different numbers of cysts. The course of the sporozoits in the mosquito from stomach to proboscis is no instance of instinctive directional migration, as is the seasonal migration of birds. MAYER for Proteosoma, and MÜHLENS for *P. vivax*, have shown that there is a veritable "septicaemia," as the illustrations reproduced in the *Bulletin* (vol. 18, pp. 103 and 104) very strikingly show. Their arrival in the proboscis would seem to be a fortuitous incident in their almost body-wide distribution, and taken in conjunction with the failure, just noted, of gametes to develop at all into sporocysts, to indicate that the chances against a mosquito, which has actually imbibed gametocytes, infecting a second individual may be more considerable than has been suspected. MÜHLENS suggests that the question of the survival of sporozoits in the scutellum, muscles and palpi of hibernating mosquitoes is one requiring further investigation. WENYON finds that if infected mosquitoes be exposed to severe cold their oocysts degenerate. If the cold to which they are exposed be moderate development ceases, to be resumed when the temperature rises. There remains, then, the possibility that under certain conditions malarial parasites may hibernate in the mosquito. There seems little question, however, but that ordinarily they "hibernate" in man.

The contraction of malaria in "uninhabited forests" raises the question whether those species of malarial parasites which medical men are prone to think of as man's especial dependents are not more promiscuous in their tastes. DONOVAN (vol. 17, p. 146) investigated this point in forests near Ootacamund, Madras. He found none of the human plasmodia in 76 *Macacus sinicus* nor in 10 *Presbytis priamus*. He detected a parasite very like *P. vivax* in *Ratufa indica malabarica*, the Malabar squirrel, and notes that MANSON has suggested that cave-dwelling bats may have been the original source of human malaria; in which connection it may be noted that RODHAIN and VAN DEN BRANDEN (vol. 11, p. 33) failed to infect with *P. falciparum* and *P. malariae* flying foxes of the species *Cynonycteris straminea*. What DONOVAN did find in these supposedly man-free forests were jungle folk heavily infected with malarial parasites. MESNIL and ROUBAUD (vol. 11, p. 32 and vol. 17, p. 146) have succeeded in infecting chimpanzees both with benign and with malignant tertian malaria by direct inoculation, but not through the intermediation of *A. maculipennis*. Both infections died out shortly and naturally. REICHENOW (vol. 17, p. 146) believes that he has found in the gorilla and chimpanzee in West Africa all the forms of plasmodia which infect man; but his own observations raise considerable doubt as to the correctness of his identifications.

Symptoms.

If there be excluded the proof by ACTON and KNOWLES that the specific gravity of the blood is lowered in malaria—a condition which, O'CONNELL suggests (vol. 15, p. 241), should govern the permission

to malarial subjects to return to the tropics—and the recent evidence by CASTELLANI and WILLMORE (vol. 18, p. 333) that glycosuria may be malarial in origin, then there is little to note under this head. That as the result of the administration of quinine there may be no symptoms, although the blood is manifestly infected, is well recognized; that this may occur naturally is less authenticated. Unfortunately reports do not always make it clear whether such a condition is natural or quinine-induced; but in any case the following facts are striking.

During the examination of 31,000 persons in Bolivar county (vol. 15, p. 135) BASS found that about 16 per cent. of those who denied present or recent clinical evidence of malaria were infected. GHIRON noted the same thing on his own person for six weeks at Vallona (vol. 15, p. 398) and in 50 per cent. of sailors whom he examined. The effect of quinine in suppressing symptoms and in thus producing many carriers, and, incidentally from the purely sanitary point of view, keeping many men in the fighting line who would otherwise have been out of it, is insisted upon by ZONDEK (vol. 15, p. 97) in Roumania; by WENYON (vol. 18, p. 326) in Macedonia, who found that in 3,000 men who had had symptoms there were 25 per cent. of carriers; and by CHRISTOPHERS and SHORTT in Mesopotamia (*l.c.* p. 325), who estimated, from the examination of 3,500 men working with their units, that on any one day there were in that expeditionary force 9,000 military carriers and fewer than 60 malarial patients.

Traumatic rupture of the spleen inspires several recent papers, HENNESSY (vol. 17, p. 297) bringing the number of his operations for this condition up to 19. He stresses the frequency with which hypogastric pain and urinary irritation simulate a ruptured bladder, and the deceptive quiescent interval between the injury and the onset of restlessness, abdominal discomfort and an increasing pulse rate. Four cases of spontaneous rupture have been recently reported. Two are by SHEAF (vol. 16, p. 340), one an English soldier in hospital in Macedonia, who had recently experienced a rough journey; the other a Russian, the accident apparently occurring while he was sitting up in bed. SKEVINGTON (*ibid.*) reports rupture in a man of 25 while he was wheeling a barrow, and INGRAM (vol. 18, p. 101) the case of a Kroo boy who died in his sleep. A fairly complete list of the literature has been collected by LEIGHTON (*l.c.* p. 334).

The danger of abortion from foetal death, greater, in his opinion, as in that of others, than is the risk from quinine administration, is emphasized by ACTON (vol. 17, p. 306), and it may well be that this condition is not due merely to high temperature, as ACTON suggests, but to active malaria in the foetus, several instances of which have been reported recently. There is no real evidence that when a positive Wassermann reaction accompanies malaria it is not due to syphilis.

Treatment.

The main curative interest, despite its imperfections and the disrepute into which it fell in Macedonia, rests with quinine, and there seems little doubt that we are reaching a better appreciation of its limitations, and so of its value. In attempting to estimate the value of different lines of treatment, one is confronted with the difficulty of determining the sense in which the word "cure" is used, whether in that of clinical betterment irrespective of subsequent relapse, or of complete disinfestation. The unfortunate looseness with which the term is used is not always avoidable, for in places where infection

is acquirable there exists the doubt as to whether a fresh manifestation is due to relapse or to a new infection. GRASSI and the French in Macedonia have courageously decided that they can distinguish between the two. The British in Macedonia, as WENYON notes, had to acknowledge that they found any such attempt futile ; and it is difficult to understand, bearing in mind the evidence collected above, how any other attitude can reasonably be adopted.

There is indeed only one way of estimating the value for disinfestation of any particular line of treatment, and that is to apply it, as was done in Dagshai, in a place where the possibility of reinfection may be disregarded. The Dagshai work emphasized several striking facts. Firstly, with the rarest exception and at all seasons of the year, relapses which occurred there were caused by the benign tertian parasite, although about half the men concerned (all soldiers diagnosed by the microscope and all treated by quinine previous to arrival) were by their history-sheets cases of malignant tertian malaria. The matter could not be dismissed as one of mistaken diagnosis, seeing that the statement held equally true for those in whom crescents were recorded in the sheets as having been present, and these are uncommonly characteristic bodies. The explanation given is that it is a mistake to speak of quinine as a specific for all malarias ; it had cured the malignant but not the benign cases, so that it should be regarded as a specific for malignant but not for benign tertian malaria. Quartan malaria was absent from the series. This view is strongly corroborated. CLARKE (vol. 16, p. 311) identified *Plasmodium vivax* alone in the blood of men who had previously served in Macedonia. PRATT-JOHNSON, GILCHRIST and HAY-MICHEL (vol. 17, p. 302) state that in German East Africa benign tertian infestations were more prone to relapse, malignant tertian more difficult to control but, having been controlled, less prone to relapse. WENYON's extensive experience has led him to the same conclusions.

These considerations apply to the asexual phase, and to that only. Regarding gametocytes, work summarized by MAYNE (vol. 16, p. 310) points in exactly the opposite direction. It suggests that the giving of quinine to gametocyte carriers prevents subsequent development in mosquitoes of *P. vivax*, but not of *P. falciparum*, and it carries the corollary, if one correlate it with the Dagshai work, that, given to an individual with mixed tertian infections, quinine will probably destroy his malignant parasites, but that so long as the gametocytes persist he will be capable of spreading the infection and constitutes a danger to others. At the same time, although it will probably not cure his benign infection, it will, so long as he takes it, emasculate his benign gametocytes, so that there is no risk of his passing this infection on to others. WENYON has just published identical conclusions independently reached.

The second fact emphasized at Dagshai is that disinfestation must be looked upon as a fractional process. For instance, each eight-weeks' course of 30 gr. of quinine daily cures about 25 per cent. of those remaining infected with benign tertian parasites, at which rate 16 courses would be required to disinfest (within a minute fraction of 100 per cent.) all those affected. Such few malignant tertian relapses as occurred suggested that each course would cure 90 per cent. of those infected. The same principle is accepted by ROSS (vol. 18, p. 338) in upholding the Single Dose Reduction Rate, which implies that a single dose of quinine will in general reduce the parasites by a definite number or a definite fraction. On this view, then, one

cannot expect certain cure from any one course of quinine, the average number of courses depending, other things being equal, on the species of parasite concerned. The dosage and route of administration of quinine have been strenuously canvassed. Some, without adequate grasp of the enormous scope of the problem, advocate normal routes other than the oral. At Dagshai it was found that an intravenous followed by an oral course of quinine resulted in more relapses than did any other line of treatment. Its rapid clinical effect, which it may be essential to utilize, is undisputed. Intramuscular injections of quinine have insistent partizans and violent foes. Assuredly every such injection produces surrounding necrosis, which, if involving a nerve, has disastrous effects (vol. 15, p. 119). To some, injections give little discomfort; others emphatically refuse a second experience. Some believe that they permit rapid absorption of quinine; others report that the drug can be recovered from the necrotic area days after its administration. If adopted, this should be done with full realization of the accompanying circumstances.

Oral administration must remain the normal route. Regarding dosage, it is agreed generally that large doses do not give such good results as do moderate ones, and that the course should run to eight or twelve weeks. The " standard treatment " of the United States, ably advocated by Bass (vol. 18, p. 97, etc.), consists of 30 gr. of the sulphate daily for the period of symptoms, and thereafter 10 gr. daily for eight weeks. It is claimed that this gives 90 per cent. of cures; whether with any particular species of parasite or not does not appear to be stated. Ross considers 10 gr. daily for twelve weeks sufficient to cure most cases. Acton's best results were got with 30 gr. daily for eight weeks. Quinine sulphate is not, however, Acton's drug of election. He stated some eighteen months ago (vol. 16, p. 330) that the cure rate of benign tertian malaria with cinchonine was 40 per cent., with cinchona febrifuge (that is the total alkaloids of cinchona) 50 per cent., with cinchonidine and quinidine 60 per cent. It is only regarding cinchona febrifuge, however, that particulars have as yet been published, and, according to them, in doses of 21 gr. daily for ten days it is as effective as and far pleasanter to take than a four-months' course of quinine, at one-twentieth of the cost. In this he largely confirms the experience of Prain and Waters; and addition to the experimental figures is to be expected. He has also recommended hydroquinine for malignant tertian malaria (vol. 16, p. 353). Publication of the requisite details regarding this important matter is long overdue.

Other than the cinchona derivatives, the most promising drug recently advocated is an infusion from the leaves or bark of *Vitex peduncularis*. Vaughan, from Ranchi, India, has given it a balanced advocacy, admirably restrained in view of the striking results he has obtained with it, both in malaria and blackwater fever, using daily 10 oz. of infusion, which represents ½-oz. of leaf.

Of other drugs tartar emetic was shown by Greig (vol. 10, p. 167) to be ineffective, since malarial relapse occurred while it was being given for Oriental sore. The salvarsans have been constantly reported as actually inducing malarial relapses and causing ocular complications, acute asthma and exfoliative dermatitis; but are advocated as adjuvants to quinine, particularly in cachectic cases. Murray (vol. 17, p. 142) prefers cacodylate of soda as an arsenical adjuvant. Urotropine has proved ineffective. Mercury is advocated by Cremonese (vol. 15, p. 126), who attributes to the effect of this metal

his experience that syphilitics constantly escape malaria. WILLIS has his own especial remedy—effective, he tells us, in every case for sixteen years (vol. 11, p. 30).

If quinine be in some disfavour, it has still no serious rival. How does it act? MORGENROTH (vol. 13, p. 81) and SCHILLING and BOECKER (vol. 15, p. 128) have determined that quinine exists in greater quantity in the erythrocytes than in the plasma. LIPKIN (vol. 15, p. 128) finds that quinine rapidly leaves the blood for the tissues and, working with RAMSDEN (vol. 12, p. 342), discovered that the quinine content of the blood in chronic malaria is lower than in normal persons ingesting the same quantity. He puts the alternative queries, apparently still unanswered: Has the malaria become chronic because the quinine content of the blood has always been low, or has the content become low as the malaria became chronic? Ross believes that "quinine resistance" results from panicky excretion of quinine by the organism and not from the development of any particular strain of parasite. Proof that such a strain could develop seems, however, to lie in experiments by the brothers SERGENT with the allied *Proteosoma relictum.* Here resistance to quinine did appear in one of many canaries experimented upon, and was transmitted unmodified through two more, and to a modified degree through a fourth bird.

It does not seem, however, that undue excretion of quinine or the establishment of quinine-resistant strains can by themselves explain such failure of quinine therapy as occurred in Macedonia. There, as WENYON has pointed out, the carriers numbered 25 per cent. of the troops, mosquitoes were numerous, and of those found in tents in the morning 70 per cent. had fed at night. Accordingly one may fairly safely visualize the unfortunate individual as collecting infections by the score, and the unhappy medical man as trying to treat in any individual patient not one or even two separate infections, but a constantly recurring series of them. Amongst this rain of sporozoits those more resistant to quinine will survive and transmit the peculiarity through their gametes to the next asexual generation, and it will thus be passed on to other victims. With frequent transmission, such as occurred in Macedonia, a quinine-resistant strain might rapidly be induced. Assumption, of course, in part, but with that touch of reasonable imagination which will probably lead onwards and not into a cul-de-sac. It has been abundantly demonstrated, for instance, in German East Africa (vol. 17, p. 294), that starved, overworked malarial cachectics will not recover, with or without quinine, unless removed to a climate fit for heroes to dwell in.

The Seasonal Variations of the Malarias.

As WENYON points out, the various factors already mentioned co-ordinate themselves into an explanation of the seasonal variations of the malarias much more reasonable than the unzoological suggestion of mutability of form.

Owing to the resistance to quinine of the asexual phase of the benign tertian parasite and the general cessation of quinine ingestion during the winter, the year starts, north of the equator, with many more active carriers of *Plasmodium vivax* than of *P. falciparum.* Mosquitoes become correspondingly infected. As symptoms appear and quinine is again ingested the gametocytes of *P. vivax* are rendered impotent, while those of *P. falciparum* are not. Then, too, the latter tend, i

heavy infections, to be more numerous than the former. Consequently mosquitoes steadily become more highly infected with malignant tertian malaria and transmit it in increasing degree, so that by autumn it is the prevalent infection.

In this connexion evidence is clearly required as to whether natural disinfestation in cases of infection with *P. falciparum* takes place more readily than when the infection is with *P. vivax*. Owing to a certain risk involved, this may not be too easy to obtain.

Immunity.

Regarding immunity there is, as Ross points out, great confusion. Tolerance of infestation without evident symptoms brands the carrier. It implies adequate compensation against ill-effects, not immunity. True immunity, or proteosoma-proofness, has been in part attained experimentally by the brothers Sergent (vol. 18, p. 96). They found that the normal immunity rate in nearly 1,000 canaries was 0·72 per cent. This can be increased to 21 per cent. by injecting blood taken from a canary during the incubation period after an experimental infection ; and to about 30 per cent. by the injection of sporozoits which had been kept *in vitro* for twelve to forty-eight hours. These very suggestive experiments will doubtless be amplified and applied to the malarial parasites.

Prophylaxis.

The main preoccupation of prophylaxis, the destruction of mosquitoes, usually in the larval stage, or their enticement to grosser food than man, has been considered by Alcock in the review on Medical Zoology (vol. 18, p. 1). It may be added that Wickliffe Rose (vol. 15, p. 131) notes that good results from larvicidal measures were obtained in Ismailia at an initial cost per head of 4*s*. 2*d*. and a recurrent annual cost of 1*s*. 8*d*., while in Port Said the corresponding cost was only 5*d*. Again, at Crosett, south-east Arkansas, physicians' calls were reduced from 2,500 to 7 annually at initial and recurrent costs of 5*s*. 2*d*. and 2*s*. 2½*d*. ; while at Hamburg, near Crosett, the corresponding figures were 2,312, 59, 6*s*. 0½*d*. and 1*s*. 10*d*. Screening produced in certain cotton plantations a 70·6 per cent. reduction in malaria, at an annual cost of 7*s*. 3½*d*. Ferrell estimated (vol. 16, p. 351) that control operations during 1920 would extend to 60 or 70 counties in the southern United States, at a cost of nearly half a million dollars. In five years' previous work the *per capita* cost had varied from a quarter of a dollar to nearly a dollar and a half, while the consequent percentage reduction in malaria was estimated as from 72 to 97. A plaint from California reveals that taxation under the Mosquito Abatement District Act amounted to 4½*d*., as against an expenditure of £10, per acre. Indeed as antilarval measures emerge from the experimental stage the financial aspect looms larger. The expenditure is comparatively easy to estimate for any particular scheme. On the credit side it is pointed out that a community should take into consideration the probable saving of medical fees and the probable extra wages earned after its expected freedom from malaria.

Moreover an economical campaign against mosquitoes will restrict itself to those species proved to be local definitive hosts. Mayne (vol. 15, p. 93) further suggests that it should, for the major part, be limited to the annual period during which these mosquitoes are infective.

This period may either be determined by actual microscopic tests, or inferred from a consideration of the conditions essential for the development of the malarial parasites in mosquitoes. GILL, for example (vol. 18, p. 328), has shown that epidemiological evidence exists that below a mean monthly temperature of 61° F. and mean monthly humidity of 63 per cent. malaria is not transmitted. HODGSON is apparently collecting experimental evidence on this matter. The area which antilarval measures must cover will, in view of recent observations indicating that the flight range of mosquitoes may extend to several miles, be determined in future more by what is financially feasible than by what is theoretically desirable.

It is clear that the war has provided experiences which have greatly advanced our knowledge on the malarias. Yet this advance has but indicated directions in which fuller knowledge is urgently required. Could the zeal with which the subject is attacked be always directed into the channels where it is most required, the advance would be much more rapid, and, incidentally, the task of the reviewer of the literature less disappointing.

MEDICAL ZOOLOGY.

ACTON (Hugh W.). **On the Behaviour of *Paramecium caudatum* towards the Cinchona Alkaloids.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 339–358. With 1 plate.

This is a very technically-expressed paper, the author evidently being—and the inference is intended as a mark of respect—a rigorous Hobbesian. It, therefore, does not lend itself to abstraction. All that can be done here is to set down some of the lessons and conclusions.

Working with a defined strain of paramoecium, variations—quite apart from those of an individual kind—in its resistance to intoxication by alkaloids of several definite strengths were found to occur, and to be due to alteration in the hydrogen ion concentration of the medium, this concentration, again, being found to vary in the main with the presence or absence of CO_2 in the medium. In other words, the amount of alkaloid necessary to kill the paramoecia is very considerably determined by the hydrogen ion concentration of the medium wherein they are living.

Paramoecia can always be cultivated from sublethal doses, but in lethal concentrations their survival depends largely on the hydrogen ion concentration of the medium. The alkaloids were found to be toxic to paramoecium in the following order:—ethyl-hydrocupreidine, ethyl-hydrocupreine (optochin), quinidine, cinchonidine, quinine, cinchonine.

Premising that what holds good for paramoecium in acid and alkaline media cannot be straightway applied to malaria parasites in the blood, the author opens out an interesting discussion on the application of these results to the treatment of malarial fevers by quinine and other cinchona alkaloids. Obviously two prime questions have to be settled by observation and experiment, namely, (1) whether it is the concentration of the alkaloid or the hydrogen ion concentration of the blood that determines the toxic effect of (*e.g.*) quinine on malaria parasites; and (2) the question of the accessibility of the parasites, since (*e.g.*) quinine circulates in the blood as a base, and as such probably does not penetrate the erythrocyte membrane.

A. Alcock.

OEHLER (R.). **Die Phagocytose der Amöben und Ciliaten verglichen mit der Phagocytose der Leukocyten.** [The Phagocytosis of Amoebae and Ciliates compared with the Phagocytosis of Leucocytes.]—*Mediz. Klinik.* 1921. Apr. 17. Vol. 17. No. 16. pp. 475–476.

From certain experiments the author infers that there is a far-reaching difference between metazoan phagocytosis and the mechanism of nutrition in bacteria-eating protozoa. The nutrition of phagocytes is osmotic, bacteria, etc., are not a necessary element of food: but bacteria-eating protozoa, however, cannot live by osmosis alone, bacteria are a necessary of life. Bacteria still living can be taken from phagocytes; but so far as we know, bacteria are quickly digested and got rid of by protozoa. Though protozoa may ingest pathogenic and non-pathogenic bacteria indifferently, they show likes and dislikes for other properties of bacteria.

A. A.

H[illegible] Mary Jane]. **The Cultivation of** *Trichomonas hominis.*—*Amer. Jl. Trop. Med.* 1921. July. Vol. 1. No. 4. pp. 211–214.

1. To a thoroughly beaten fowl's egg, 200 cc. of Locke solution (sodium chloride 0·9 gm., calcium chloride 0·024 gm., potassium chloride 0·042 gm., sodium carbonate 0·02 gm., dextrose 0·25 gm., distilled water 100 cc.) is added; the mixture is heated, in constant motion, over a hot-water bath for fifteen minutes, and then filtered through cotton-wool with a suction pump. Test-tubes are charged with 6 cc. of the filtrate and autoclaved under 15 lb. pressure for twenty minutes, and are ready for inoculation. Trichomonas cultivated in this medium appeared in greatest numbers on the second day, and rarely lived longer than six days.

2. To the thoroughly beaten whites of two eggs 200 cc. of a 0·7 per cent. salt solution are added; the mixture is cooked, as before, for half an hour, then filtered, mixed, and autoclaved, as before. Trichomonas cultivated in this medium were most numerous on the third day, and lived for six to ten, or even eleven days. With a few drops of sheep serum or human serum added the organisms throve even better, though they did not last so long.

The organisms did not encyst in any of the cultures; they became vacuolous and went to pieces.

A. A.

Akatsu (Seiji). **On the Cultivation of** *Tetratrichomonas hominis.*—*Kyoto Igaku Zassi.* 1921. Aug. Vol. 18. No. 7. [In Japanese, pp. 65–72. With 2 plates. English summary, p. 71.]

The author used clotted ascitic fluid, inoculating with a capillary pipette containing a small amount of dental tartar. Some remarkable forms are figured.

A. A.

H[illegible] Mary Jane]. *Wasäia intestinalis*: **Its Cultivation and Cyst Formation.**—*Jl. Amer. Med. Assoc.* 1921. July 9. Vol. 77. No. 2. pp. 112–113. With 2 text figs.

The author describes and figures *Wasäia intestinalis* in its free and encysted forms, from cultivated specimens derived from the stool of a native of the United States having a history of diarrhœa persistent for many years. She also describes the media—ovomucoid, Locke-egg, and ox-bile salt—in which the organism was successfully cultivated.

A. A.

Paez (Felix R.). **Un caso de infeccion doble por Anquilostomos y Lambiias.**—*Gac. Med. de Ciudad Bolivar.* 1919. Sept. No. 62. pp. 32–36.

A brief account of a fatal case of inveterate diarrhœa with extreme anæmia and prostration in a deaf-mute boy of eight years of age. Examination of the mucous deposits revealed numerous *Lamblia intestinalis* and eggs of *Ancylostoma duodenale*. The author states that it is the first case of Lamblia infection he has met with in Ciudad Bolivar. The remainder of the article is a summary of the present state of knowledge concerning the life-history, etc., of Lamblia.

F. S. Arnold.

ZOTTA (G.). **Sur la transmission expérimentale du** *Leptomonas pyrrhocoris* **Z., chez des insectes divers.**—*C.R. Soc. Biol.* 1921. June 25. Vol. 85. No. 23. pp. 135–137.

This investigator has, by inoculation into the body-cavity, infected various Hemiptera, coleopterous and lepidopterous larvae, and Diptera with *Leptomonas pyrrhocoris*, but has failed to infect the water beetle *Hydrophilus piceus*, and the Phasmid, *Carausius morosus*. The infection elicits a profusion of gigantic phagocytes.

The mealworm and the caterpillar of the bee-moth are terribly susceptible; in the latter the infection, which is prodigious, spreads to the wall and lumen of the gut, and generally proves mortal.

A. A.

SERGENT (Et. & Ed.). **Formes leishmaniennes et leptomonadiennes chez les punaises de chauves-souris.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 413–415. With 1 text fig.

CHATTON and COURRIER, having lately observed, in Alsace, a bat-trypanosome with a development something like that of *Schizotrypanum cruzi*, have suggested the possibility of bats being a reservoir of the virus of goitre, from which Diptera having aquatic larvae may carry infection. But the present authors described the said bat-trypanosome sixteen years ago and noticed their frequency in Algiers. They now figure leptomonas and leishmania forms found (at Debrousseville in Algiers) in one of the bat bugs (*Cimex pipistrelli*) and hint at a possible genetic connexion between these and the trypanosome.

At the time when they made a survey of the endemicity of goitre in Algiers they found that goitre is unknown in the great plain of Habra, of which Debrousseville occupies the centre.

A. A.

i. HAUGHWOUT (Frank G.). **A Case of Human Coccidiosis detected in the Philippine Islands, with Remarks on the Development and Vitality of the Cysts of** *Isospora hominis* **(Rivolta).** *Philippine Jl. Sci.* 1921. Apr. Vol. 18. No. 4. pp. 449–482. With 3 plates, 1 folding map and 1 text fig.

ii. **Coccidiosis in Man as a Possible Sanitary Problem in the United States.**—*Jl. Amer. Med. Assoc.* 1921. Sept. 17. Vol. 77. No. 12. pp. 940–941.

i. This well-analysed case forms the text of a long and interesting study of the subject of human coccidiosis.

The case itself is that of an American chemist, aged 32, who had travelled fairly widely, and in the course of his work had come in contact with workmen from many parts.

The clinical symptoms were anorexia, lassitude, occasional nausea, and occasional watery diarrhoea; there was no pain or griping, nothing but a dull feeling of discomfort in the abdomen. The stools were always faeculent, and they did not contain anything pathological except shed epithelial cells and oocysts of *Isospora hominis*. (Blastocystis was also present.) The patient was under observation for more than four months, and was still infected when he left the author.

The development of the oocysts is described in detail, and epidemiology, pathogeny, treatment, etc., are discussed, though nothing new is added.

The physical resistance of the cysts outside the body was experimentally tested by exposing faeces containing cysts that had not got beyond the sporoblast stage to the hot March Manila sun for three hours of the forenoon during seven consecutive days. On being restored to moisture at the end of the week some of the cysts resumed development, and ultimately showed sporozoites, which from their colour and general appearance were judged to be alive.

A list of 18 papers is appended.

ii. The above case is here reported in less detail.

A. A.

HAUGHWOUT (Frank G.). **Note on a Case of Human Infection with *Isospora hominis* probably originating in the United States.**—*Jl. Parasit.* 1921. Sept. Vol. 8. No. 1. pp. 45–46.

Attention is directed to this case and to eleven other cases detected in the United States since 1918, in relation to the number of coccidiosis infections observed in troops in and returned from the Eastern Mediterranean area.

A. A.

SERGENT (Etienne). **Le diagnostic de l'infection latente dans le paludisme des oiseaux.** (*Plasmodium relictum.*)—*C. R. Soc. Biol.* 1920. July 17. Vol. 83. No. 25. pp. 1063–1064.

With bird malaria (Proteosoma), as with human malaria, the microscope alone is not sufficient to decide the expiry of infection. The persistence of a Proteosoma infection not discernible by the microscope may be elicited by the following experimental test methods: (1) complete indifference to a fresh infection—the surest test; (2) persistent infectivity of the blood when injected into clean birds of the same species; (3) persistent infectivity of the blood to *Culex*—a precarious test [and obviously so, if unconditioned]; (4) liability to relapse on particular provocation, by heat (twelve hours at 37° C.), cold (three consecutive days below 0° C.), cold douche, or injection of alien blood (human or rat)—an even more precarious test. After death, hypertrophy of the spleen is a sure sign of persistent infection.

A. A.

SINTON (J. A.). **Infection with *Nuttallia ninense* among Hedgehogs in the North-West Frontier Province, India.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 359–363. With 2 coloured plates.

The parasite, which is almost certainly YAKIMOFF'S *Piroplasma ninense* originally discovered in the European hedgehog, is here very fully described and figured.

A. A.

BOËZ (L.). **Schizogonie et lésions pulmonaires dans un cas de toxoplasmose spontanée du chien.**—*C. R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 479–482. With 1 text fig.

Of this toxoplasmosis of the dog only six cases have been observed, and two of them seem to be doubtful. In the case here reported the characteristic features were the extensive riddling of the lungs with small whitish nodules, from a pin-head to a pea in bigness, and the

normal condition of the spleen and all the other viscera, though the glands of the hilum of the lung were enlarged.

In smears of the lungs numerous toxoplasmata were seen—little crescents 3μ to 6μ long, sometimes dividing by longitudinal fission, sometimes multiplying by schizogony.

Two dogs inoculated, one subcutaneously, the other intraperitoneally, with the pulp of a nodule from the lung showed no effects up to a year afterwards.

A. A.

i. PHISALIX & TEJERA (E.). Sur une hémogrégarine et ses kystes de multiplication chez un lézard Iguanidé. *Tropidurus torquatus*, Wied.—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. 783–785.

ii. HOARE (Cecil A.). On Some New Hemogregarines from British East Africa.—*Parasitology.* 1920. Dec. Vol. 12. No. 4. pp. 315–327. With 1 plate.

iii. STAMMERS (G. E. F.). Haemogregarines in Black Rats.—*Jl. Trop. Med. & Hyg.* 1920. Dec. 15. Vol. 23. No. 24. pp. 298–299. With 3 text figs.

iv. LEGER (A. & M.). Hémogrégarine d'un poisson marin (*Diagramma mediterraneum*).—*C.R. Soc. Biol.* 1920. Oct. 16. Vol. 83. No. 28. pp. 1275–1277.

v. DELANOË (P.). Au sujet d'*Haemogregarina Brendae*, Sambon et Seligmann.—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 451–453. With 1 text fig.

vi. SERGENT (Étienne). Hémogrégarine (Hepatozoon) de l'écureuil de Gétulie.—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. p. 56.

i. A purely descriptive paper of the several forms of a haemogregarine found in a species of lizard.

ii. Descriptions of haemogregarines from two snakes and two toads. From one of the toads some small spore-like bodies are figured, which are said sometimes to occur in pairs or in fours-in-a-row.

iii. A note of the occurrence of a haemogregarine in black rats out of a ship from Sweden in the port of London.

iv. Description of a new species, *Haemogregarina dakarensis*, from a pristipomatid fish, *Diagramma mediterraneum*. A list of 28 piscine haemogregarines, with their respective hosts, is given, with the caution that some of them may prove to be synonyms.

v. A description, with some figures, of forms observed in abundance in blood taken from the heart of *Psammophis sibilans*.

vi. A short note on a new species of Haemogregarine, *Hepatozoon gaetulum*, found in abundance in the uninuclear leucocytes of squirrels (*Atlantoxerus gaetulus*) from the Libyan Sahara.

A. A.

i. KUDO (R.). On some Protozoa parasitic in Fresh-Water Fishes of New York.—*Jl. Parasit.* 1921. Vol. 7. pp. 160–174. With 4 text figs.

ii. ROMERO SIERRA (J. M.). Estudio y clasificacion de un ascaris. Contribucion al estudio de la parasitologia en Venezuela.—13 pp. With 1 plate. 1921. Caracas.

iii. GALLI-VALERIO (B.). Parasitologische Untersuchungen und Beiträge zur parasitologischen Technik.—*Cent. f. Bakt.* 1. Abt. Orig. 1921. June 11. Vol. 86. No. 4. pp. 346–352.

i. Two new species of Myxosporidia, namely, *Wardia lucii* and *Myxidium moxostomatis*, parasitic in *Lucius reticulatus* and *Moxostoma* sp., are described and figured. *Myxidium lieberkühni*, Bütschli, and *Trypanosoma remaki*, Lav. and Mesnil, are also figured, with a commentary.

ii. This seems to be a short essay based on extracts from a laboratory notebook; it contains nothing novel or important.

iii. This is a hotch-potch from which many facts of more or less use may be picked. It ranges from yeasts and bacteria to worms and Arthropoda, and touches on their geographical distribution, their hosts, and other sundries. There are also a few remarks on stains and on a field microscope.

A. A.

SERGENT (Edm.). **Sur l'hypothèse de l'évolution des *Sarcocystis* du boeuf chez un insecte hématophage, hôte définitif.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 408–411.

In a drop of blood taken from the dewlap of a calf the author found a good number of spores resembling those of *Sarcocystis Blanchardi*. Two distinct kinds of spores were observed—one smaller, the cytoplasm staining a deep blue, the chromatin compact and staining uniformly dull red; the other larger and more oval, the cytoplasm staining a pale rose or mauve or bluish-green, the chromatin mass smaller and not staining so uniformly nor so well defined; in two fields a pair of these different kinds were seen coupled end-on.

The author considers the argument for and against the spores having been present in the blood itself and not in the tissues pricked; for the two different kinds being male and female; and for its bearing on the different hypotheses of the relation of Sarcocystis to blood-sucking insects.

A. A.

i. KUDO (R.). **Studies on Microsporidia, with Special Reference to those Parasitic in Mosquitoes.**—Reprinted from *Jl. of Morphol.* 1921. Mar. Vol. 35. No. 1. pp. 153–193. With 5 plates and 1 text fig.

ii. ——. **On the Structure of Some Microsporidian Spores.**—*Jl. Parasit.* 1920. June. Vol. 6. pp. 178–182. With 1 text fig.

iii. ——. **Cnidosporidia in the Vicinity of Urbana.**—Reprinted from *Trans. Illinois State Acad. Sci.* 1920. Vol. 13. pp. 298–303.

i. After a review of the subject the author describes *Thelohania magna* from the adipose tissue of the larva of *Culex pipiens*, and *T. illinoisensis* from that of the larva of *Anopheles punctipennis*, also *Nosema baetis* from the nymph of a species of *Baetis*—all three being new species. Heavy infection with *T. magna* seems to be fatal to the host, and the author suggests a practical application of this fact.

ii. The spore of *Thelohania magna* being particularly large (12-13·5*u* long), is here described and figured; it has a distinct polar capsule, and a spiral filament without a central axis; the sporoplasm is rounded, and contains a single nucleus.

iii. Fishes in this part of Illinois are heavily infected with Myxosporidia; a list of species and hosts is here recorded. Microsporidia also are common among some of the aquatic insects.

A. A.

KUDO (R.). **On the Nature of Structures Characteristic of Cnidosporidian Spores.**—Reprinted from *Trans. Amer. Microscopical Soc.* 1921. Apr. Vol. 40. No. 2. pp. 59–74.

From the observations here recorded the author concludes (1) that the spore membrane of *Nosema apis* and *bombycis*—taken as representatives of the Microsporidia—is similar to chitin, and that of the

Myxosporidian *Henneguya salminicola* is less similar to chitin, in chemical reactions; (2) that the polar filaments of Cnidosporidian spores are "formed by the mixture of part of the nucleus and a substance differentiated in the capsulogenous cell"; and (3) that the iodinophilous vacuole of the spores of Myxobolidae contains a substance having chemical reactions similar to glycogen. Extrusion of the polar filament is elicited by pressure, and by solution of KHO or perhydrol.

A. A.

BARRET (Harvey P.) & YARBROUGH (Nancy). **A Method for the Cultivation of** *Balantidium coli.*—*Amer. Jl. Trop. Med.* 1921. May. Vol. 1. No. 3. pp. 161–164.

For cultivation of *Balantidium coli* 0·5 per cent. salt solution is the proper tone, partial anaerobic conditions are favourable, and a temperature of 37°–38° C. appears to be the best.

The medium here used was a mixture of 1 part inactivated human blood serum and 16 parts of 0·5 per cent. salt solution. About 8 cc. of the medium is put into a narrow test-tube, and 0·1 cc. of pure faeces containing mucus is pipetted into the bottom of the tube, which is then incubated at 37° C.

Only moderate growth took place in the first 24 hours; 48 to 72 hours seemed to be the optimum. Moderate bacterial growth was favourable; excessive growth of bacteria was very unfavourable. Simple fission was commonly seen, encystment sometimes, and apparent conjugation once.

Subcultures were usually made every second day. A strain was kept up for 32 days, and only lapsed because after the eleventh transplantation subculture was delayed for five days, by which time the organisms had disappeared.

A. A.

MAXWELL (J. Preston). **Intestinal Parasitism in South Fukien.**—*China Med. Jl.* 1921. July. Vol. 35. No. 4. pp. 377–382.

By reason of the habitual use of human excreta in cultivation in China, the soil and water (which is not filtered for use) and crops (certain kinds of which are eaten raw or imperfectly cooked) are persistently polluted, and infection with intestinal parasites is naturally very common. The author mentions nine kinds of intestinal worms observed by himself, as well as *Entamoeba coli* and *histolytica* and *Balantidium coli*. From data obtained from 8,000 stools he calculates, by some method not explained, that of the general population of the southern half of the province of Fukien 78 per cent. have *Ascaris lumbricoides*, 11 per cent. *Trichuris trichiura*, and 11 per cent. *Ancylostoma duodenale* and *Necator americanus* combined.

Infection with Ancylostoma, Necator, and Ascaris is much less frequent among opium smokers than among others; this is to be explained, in the case of the two first, by the fact that opium smokers are too lazy to work in the (infected) fields; but in the case of Ascaris it is a simple unexplained fact.

Clonorchis sinensis and *Fasciolopsis buski* have not been observed in the area of the author's investigation.

A long list of intestinal parasites of the local domestic animals is given.

A. A.

SWELLENGREBEL (N. H.). **De Anophelinen van Nederlandsch Oost-Indië.**—*Koloniaal Instituut te Amsterdam. Mededeeling No. 15, Afdeeling Tropische Hygiene No. 10.* pp. x + 155. With 76 text figs. and 20 coloured plates.

This work on the Anophelines of the Netherlands East Indies can be confidently recommended both to students and to teachers. It gives a clear, succinct, and well-ordered account, illustrated both by coloured plates and by pointed and explicit text figures, of all the local species. Each species is critically described in its female, male, and larval forms, and also, as far as possible, in its biology, its breeding-grounds, and its pathogenic activities.

The introductory chapters contain an account, full in detail yet very simple and lucid in statement, of the external features and characters of the Anopheles type, and synoptic tables for the specific identification of males, females, and larvae.

In his systematic presentation of the subject the author recognizes Stethomyia, Myzorhynchus, Myzomyia, Neomyzomyia, Nyssorhynchus, etc., as distinct generic terms, and splits his Myzomyia species into two groups under *M. rossi* and *M. aconita* respectively.

A. A.

MARTINI (E.). **Die Tasterfrage bei den Stechmücken.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 10. pp. 295–301. With 3 text figs.

A discursive but interesting paper. The author concludes that the number of palp segments is of little value for determining the genetic relations of Culicidae. He also states that the genitalia of the male are very variable, but that the chaetotaxy of the larva is very constant.

A. A.

SENIOR-WHITE (R. A.). **A Survey of the Culicidae of a Rubber Estate.** —*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 304–325. With 3 plates, 1 text fig. and 1 folding chart.

This is a model paper, though the details, of course, are mainly of local interest. The survey was continued for one complete year. The topography of the estate is described, and breeding-places are mapped; the individual breeding-places are described and well figured, and their culicid fauna at different seasons is specified; and then the individual species are treated seriatim with reference to seasonal occurrence, breeding haunts, and any other noteworthy particulars. There are also tabulated summaries showing, among other things, the breeding-results month by month, the monthly breeding-totals of each species observed, the species associated in each different type of breeding-haunt, and the malaria relations. The only abundant malaria carrier of the area (a hilly tract of 1,000 to about 4,000 feet elevation in the Central Province of Ceylon) is *A. maculatus*, which breeds in every month of the year, and in every permanent water except the river (of the estate surveyed), though a larva was once discovered in water lodged in a coconut shell. *Stegomyia fasciata* was not observed, and is stated by the author to exist, probably, only at Colombo and Trincomalee.

During the survey a record was kept of Anophelines captured in the author's bungalow; none was taken in bedrooms; those taken were on windows of the verandah.

A. A.

FEDERATED MALAY STATES: **Malaria Bureau Reports.** 1920. Nov. Vol. 2. 47 pp. By H. P. HACKER, M.D., B.Sc. (Lond.), Medical Entomologist, Federated Malay States. 1921. Printed by Waterlow & Sons, Limited, London, Dunstable and Watford.

Nearly half this report is occupied with details of the author's statistical method of studying the specific inter-associations of Anopheles larvae. The number of times a particular species is found with each of the other species of the district are added all together and the association with each of those species expressed in percentage. It is not surprising to find that the practical results harmonize with those of ordinary observation.

Interesting observations were made of Anopheles larvae breeding in old tins, pottery, discarded utensils, and neglected water-tanks; twenty-seven instances were observed, and in all cases the various receptacles contained earth, leaves, weed, etc., and had therefore come to resemble a natural breeding-place.

In 46 wells examined Anopheles larvae were found only in two instances, and then in wells having no depth of water.

The last item of the report deals with an investigation of an outbreak of malaria on the banks of the Perak River in January, and as the result of minute and careful observations it was concluded that *A. ludlowi* was mainly responsible.

A. A.

WESENBERG-LUND (C.). **Les Anophélines du Danemark et les fièvres paludéennes.**—*C. R. Soc. Biol.* 1921. July 16. Vol. 85. No. 26. pp. 386–387.

In Denmark *Anopheles plumbeus* is rare, *A. bifurcatus* inhabits forest and bites after nightfall, and *A. maculipennis*, which is the dangerous species in respect of malaria, has, as a consequence of a revolution in the national methods of dairy and farm already considered by the author [this *Bulletin*, Vol. 18, p. 193], completely lost contact with man. Hence the malaria chain has been broken.

A. A.

LEGENDRE (J.) & OLIVEAU (A.). **Rôle du lapin domestique dans l'attraction et la nutrition d'***Anopheles maculipennis.*—*C. R. Acad. Sci.* 1921. Mar. 29. Vol. 172. No. 13. pp. 822–823.

These authors have observed that *Anopheles maculipennis* has a marked preference for the blood of the rabbit, and they think that this preference can be turned to good purpose in malarious districts. [Colonel S. P. JAMES has made the same observation in the island of Sheppey, and made the same suggestion last year in a lecture at the School of Tropical Medicine in London.]

A. A.

GORDON (R. Montgomery) & YOUNG (C. J.). **The Feeding Habits of** *Stegomyia calopus*, **Meigen.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 265–268.

MARCHOUX and SIMOND have stated that since *Stegomyia calopus* (= *fasciata*), after the first six or eight days of its existence, does not bite during the day, and since also a Stegomyia acquiring the infection

of yellow fever does not become infective until at least twelve days afterwards, yellow fever cannot be contracted by man during the daytime.

The experiments here recorded show that Stegomyias under perfectly natural conditions will bite either by day or by night—certainly more than fourteen days after the first meal of their life.

A. A.

KONSULOFF (St.). **Die Lebensbedingungen der Anophelinen in Bulgarien in Zusammenhang mit der Malaria-Verbreitung.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. pp. 227–240. With 2 charts in text.

In Bulgaria unusually and persistently low spring temperatures check the number of Anopheles in the following summer. Spring rains have no effect on the summer numbers of *Anopheles maculipennis* and *sinensis*, but rain in July and August favours the increase of these species. The number of *A. superpictus*, however, depends on the amount of rain in the spring and early summer.

A. A.

CONNOR (M. E.). **Fish in Extermination of Mosquitoes.**—*Gac. Méd. de Mexico.* 1920. Aug.–Dec. Vol. 1. Ser. 4. No. 7. p. 543. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Oct. 1. Vol. 77. No. 14. p. 1139.]

Connor states that by means of fish 30,000 cisterns, etc., in Guayaquil were freed from mosquito larvae. The most useful local fish is the *chalaco*. The fishes are distributed from house to house by sanitary inspectors, whether larvae are living in the cisterns, etc., or not, and the people love their fishes, some families having kept the same fish for eighteen months.

A. A.

HILDEBRAND (Samuel F.). **Suggestions for a Broader Application of Gambusia for the Purpose of Mosquito Control in the South.**—*Public Health Rep.* 1921. June 24. Vol. 36. No. 25. pp. 1460–1461.

No one has any doubt that fishes are an efficient check on mosquitoes breeding in ponds and borrow-pits, particularly where the water is free of weed; and the author here advocates the employment of special measures for breeding, distributing, and advertizing Gambusia for this purpose.

A. A.

YOUNG (C. J.). **Natural Enemies of** *Stegomyia calopus*, **Meigen.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 301–312. With 2 text figs. and 2 plates.

An interesting experiment confirming the well-known fact that dragon-fly larvae and certain aquatic bugs are destructive to mosquito larvae. Adult dragon-flies also were observed to catch *Stegomyia calopus* (= *fasciata*) on the wing when they were given an opportunity of doing so under observation.

A. A.

CABALLERO (Arturo). **Las especies del género Chara y las larvas de los mosquitos.**—*Anales del Instituto General y Técnico de Valencia.* No. 10. pp. 5–17.

The author has extended his laboratory investigations into the field and has satisfied himself that three species of Chara, namely *C. foetida, C. contraria,* and *C. hispida,* possess the power of destroying mosquito larvae.

A. A.

ROUBAUD (E.). **Mode d'action du trioxyméthylène en poudre sur la larve d'anophèle.**—*C.R. Acad. Sci.* Paris. 1920. July 5. Vol. 171. No. 1. pp. 51–52.

The author's advocacy of trioxymethylene powder (paraform) as a larvicide specific to Anopheles has been noticed in this *Bulletin* (Vol. 17, p. 115). Here it is explained that the larvicidal power is exercised by the disengaged vapours, which are very quickly dissolved in the water, so that the larvicidal action, though potent, is transient; also that larvae can become immunized to the vapours, though the immunization also is transitory.

The condition of the Anopheles larva paralysed by trioxymethylene is curiously like that of the paralysed insects in the nursery-larders of the fossorial and solitary wasps, the Anopheles larva being not only mortally paralysed, but also wonderfully preserved against putrefaction.

A. A.

LAMBORN (W. A.). **A Protozoon Pathogenic to Mosquito Larvae.**—*Parasitology.* 1921. Aug. Vol. 13. No. 3. pp. 213–215.

In a batch of 29 larvae of *Stegomyia scutellaris* found in an old pot in a Malay garden many were seen by naked eye to have white opalescent gills. Under the microscope the appearance was found to be due to crowds of Protozoa, which in some cases had invaded the general body-cavity as far as the head and antennae. These Protozoa were in active movement, and on escape they were seen to be flagellated. Their effect on the larvae was that the gills, some or all, became detached; and ultimately all the larvae died, most of them before pupation. Fresh larvae introduced at once into the infected water did not become infected, nor did larvae introduced successively for some time afterwards; but some larvae introduced nearly three months afterwards did become infected.

A. A.

KEILIN (D.). **On a New Ciliate: *Lambornella stegomyiae*, n. g., n. sp., Parasitic in the Body-Cavity of the Larvae of *Stegomyia scutellaris* Walker (Diptera, Nematocera, Culicidae).**—*Parasitology.* 1921. Aug. Vol. 13. No. 3. pp. 216–224. With 6 figs. in text.

The protozoon observed by LAMBORN in the gills and body-cavity of the larva of *Stegomyia scutellaris* is here fully described and figured under the name of *Lambornella stegomyiae,* n. gen., n. sp. It is a holotrichous ciliate possessing a small mouth. It multiplies by transverse fission in the body-cavity of the insect, and finally escapes and becomes encysted. The author believes it to be the only known species of Ciliate parasitic in the body-cavity of an insect. He appends a list of Ciliates parasitic in other Arthropods.

A. A.

KEILIN (D.). **On a New Type of Fungus:** *Coelomomyces stegomyiae*, **n. g., n. sp., Parasitic in the Body-Cavity of the Larva of** *Stegomyia scutellaris* **Walker (Diptera, Nematocera, Culicidae).**—*Parasitology.* 1921. Aug. Vol. 13. No. 3. pp. 225–234. With 7 figs. in text.

The free sporangia of this parasite were found in enormous numbers packing the tracheal gills and neighbouring segments of a larva of *S. scutellaris* from the Federated Malay States. In sections of the larva the mycelium was found ramifying in the walls of the midgut and beneath the hypoderm. The mycelium does not show any distinction of cells. The development of the sporangia, from terminal thickenings of the branches of the mycelium, is described as far as possible. The sporangia observed were of two kinds—thick-walled, which perhaps are resistant or resting forms, and thin-walled.

The systematic position of Coelomomyces is not quite clear; it would appear to belong to the Phycomycetes, and undoubtedly shows some resemblance to the Chytridineae.

A list of parasites of mosquito larvae recorded by different authors is appended; it includes species of fungi, bacteria, spirochaetes, gregarines, schizogregarines, microsporidia, flagellates, ciliates, and nematodes.

A. A.

i. KIEFFER (J. J.). Chironomides des Philippines et de Formose.—*Philippine Jl. Sci.* 1921. May. Vol. 18. No. 5. pp. 557–593.

ii. AUSTEN (E. E.). A Contribution to the Knowledge of the Blood-sucking Diptera of Palestine, other than Tabanidae.—*Bull. Entom. Res.* 1921. Sept. Vol. 12. Pt. 2. pp. 107–124. With 1 plate and 3 text figs.

iii. CARTER (Henry F.), INGRAM (A.) & MACFIE (J. W. S.). Observations on the Ceratopogonine Midges of the Gold Coast, with Descriptions of New Species. Part IV.—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 177–212. With 13 text figs.

iv. SALM (A. J.). Enkele nieuwe bloedzuigende insekten.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 1. pp. 58–64. With 2 plates.

v. STRONG (W. M.). Phlebotomus Flies in Papua. [Correspondence.]—*Med. Jl. Australia.* 1921. Sept. 3. 8th Year. Vol. 2. No. 10. p. 193.

vi. GALLI-VALERIO (B.). Beobachtungen ueber Culiciden.—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Mar. 15. Vol. 86. No. 1. pp. 31–33.

vii. SWELLENGREBEL (N. H.). De mannelijke genitalien der Nederlandsch Indische Anophelinen.—*Tijdschr. v. Entomol.* 1921. Vol. 64. pp. 36–45. With 7 text figs.

viii. (*a*) MARTINI (E.). Anopheles in Niedersachen und die Malariagefahr. (Nach einem Vortrag auf der 86 Versammlung Deutscher Naturforscher und Aerzte.)—*Hygienische Rundschau.* 1920. Nov. 15. Vol. 30. No. 22. pp. 673–677.

(*b*) ——. Neuere, zur Beurteilung der Malaria- und Anophelesverhältnisse in Deutschland wichtige Literatur. (Ergänzung zu meinem Aufsatze in No. 22 der "Hygienische Rundschau" S.673.)—*Ibid.* Dec. 15. Vol. 30. No. 24. pp. 737–742.

i. A systematic paper, including descriptions of 35 new species of Chironomidae.

ii. This paper includes descriptions of six new species of Culicoides and one new species of Simulium and Lipoptena severally.

iii. This paper contains a full account of the genus Dasyhelea, and detailed descriptions of twelve new species.

iv. Two new species of Ceratopogoninae, namely *Ceratopogon raphaelis* and *Culicoides esmoneti*, are described and figured, and merely some measurements of a third, *Culicoides javanicus*, are tabulated.

v. An undetermined species of Phlebotomus from Papua is mentioned.

vi. Miscellaneous observations made in the neighbourhood of Lausanne; nothing of general interest.

vii. The male genitalia of the Anophelines of the Netherlands Indies are described.

viii. (*a*) This paper is intended for local information. Its aim is to draw attention to the desirability of a proper knowledge of the distribution of Anopheles; so that, in view of any anxiety felt as to recrudescence of malaria through troops returning home from malarious countries, that knowledge can be utilized in choosing situations suitable for malaria sanatoria and avoiding situations where infection is likely to be spread by Anopheles.

(*b*) A list of 108 publications referring to the subject.

A. A.

PATTON (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part IV. Some Mesopotamian Nematocera of Economic Importance.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 245–252. With 1 plate.

Culicoides mesopotamiensis and *Tersesthes mesopotamiensis*, n. spp., are described and figured. Many individuals of different species of Culicoides were examined for flagellates, without success. Larvae and pupae may be destroyed extensively by clearing away weeds and decaying vegetation from the margin of streams and ponds.

Phlebotomus papatasii and *minutus* are found everywhere in Mesopotamia, the former, which is the commoner, being one of the most serious local insect pests. They appear to breed in crevices in the ground and to hibernate as larvae. The writer believes that the Herpetomonas parasite of these midges is responsible for oriental sore in Mesopotamia, passing through the skin when the insect is crushed in the act of biting.

The commonest local Anopheles is *A. pulcherrimus*, which abounds in all marshy tracts; it may bite by day. *A. stephensi* is common in and around Busra, and breeds in water-channels among the date palms. *A. sinensis*, *A. maculipennis*, and *A. lukisi* are other Mesopotamian species. *Aëdes calopus* (= *Stegomyia fasciata*) was observed in several places.

A. A.

KOBAYASHI (Harujiro). **Overwintering of Flies.**—*Japan Med. World.* Tokyo. 1921. July 15. Vol. 1. No. 3. pp. 11–14.

The house-fly referred to in this paper is stated to be *Musca domestica*. In Corea house-flies are found in ordinary houses in the winter. House collections made between January 8th and March 1st yielded nearly 2,600 females and nearly 1,900 males. Some of the females of a collection made on the 12th January had mature ovaries and the spermathecae charged. Females captured in the winter sometimes deposited eggs in the laboratory.

The author kept several hundred females alive in test-tubes in the winter and spring (January to April and May) for over 100 (101 to 120) days, five or six up to several dozen flies being put into a single broad tube with moistened biscuit, and the tubes being kept in the laboratory where the temperature ranged between 5° and 18° C.

Eggs did not hatch in the open laboratory at these temperatures. Larvae of the third instar died when submitted to a temperature of $-12\cdot5°$ C. for 24 hours. Of full-grown larvae submitted to temperatures of $-5°$ to $-6\cdot5°$ C. for a week, 25 per cent. lived, the rest died either before or after pupation. Pupae kept in the open laboratory (temperature ranging between 5° and 18° C.) hatched in a few weeks; pupae kept at $-0\cdot5°$ to $-12\cdot5°$ C. for a week died, but those kept at $-12\cdot5°$ C. for one day survived. Adult flies survived all the above stated temperature tests.

Stomoxys calcitrans, in the laboratory, deposited eggs in November, the issue of which pupated in February and March and reached the imago stage on April 23rd.

A. A.

SINTON (J. A.). **Some Cases of Myiasis in India and Persia, with a Description of the Larvae causing the Lesions.**—*Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 132–162. With 4 plates and 8 text figs.

This paper is full of careful descriptive detail, the larva of *Chrysomyia dux* in particular being described at very great length and—as also that of *Lucilia serricata*—very fully figured. Of the six cases of myiasis that form the nucleus of this comprehensive piece of work, three, which are described at some length, were in man, two were in the camel, and one in a dog.

The human cases were nasal, from which 66 larvae of *Chrysomyia dux* were removed; buccal, 16 larvae of a Chrysomyia closely resembling *dux* removed; and cutaneous, 45 larvae of *Lucilia serricata*. The larvae from the camel were *Wohlfartia* sp. in one case, and *Sarcophaga* sp. in the other; and those from the dog were *Sarcophaga ruficornis* and *Chrysomyia dux*.

Besides the descriptions and figures alluded to above there are some figures of larval parts of *Sarcophaga ruficornis* and *Wohlfartia* sp. and briefer descriptions of the different stages of all the other species concerned.

The subject of the paper is introduced by a synopsis of cases of myiasis previously recorded in India, and concluded with a bibliographical summary. The author is to be congratulated on a very useful piece of work involving much labour.

A. A.

LEON (N.). **A Case of Urethral Myiasis.**—*Jl. Parasit.* 1921. June. Vol. 7. No. 4. pp. 184–185.

The patient in this case produced eleven larvae, stated to have been passed during micturition, having some days before been troubled with voluptuous sensations. The larvae were identified as *Musca domestica*. The author's incredulity was appeased by the patient then and there complaining of a recurrence of the sensations and suddenly in a painful orgasm ejecting eight larvae specifically identical with those at first produced. These larvae were kept, but died two days afterwards.

The author gives reference to two other cases of urethral myiasis, namely R. CHREVREL, *Arch. Parasit.*, 1909, pp. 370–450, and E. HAENENS, *Ann. Bull. Soc. Med. d'Anvers*, 1898, pp. 101–112.

A. A.

WOLLMAN (E.). **Le rôle des mouches dans le transport des germes pathogènes étudié par la méthode des élevages aseptiques.**—*Ann. Inst. Pasteur.* 1921. July. Vol. 35. No. 7. pp. 431–449. With 3 text figs.

The substance of this paper has already been recorded [this *Bulletin*, Vol. 18, p. 200]; in the present paper the subject is presented in full historical detail and perspective.

Experimenting with Calliphora, Lucilia, and Musca, in relation to the several bacilli of anthrax, dysentery, tubercle, and typhoid, if the experiments were rigidly sterilized through all phases, in no case did germs ingested by the larva pass on to the adult.

Sterile conditions were assured by washing the egg-packet alternately in 1 in 2,000 sublimate solution and in distilled water. After a final washing in distilled water the eggs (either singly or several together) are carefully transferred to sterile tubes provisioned with sterilized food; and when the eggs hatch emulsions of the specific bacillus are introduced. Subsequently, in examining the pupae, one end of the pupa is flamed and opened with sterilized scissors and the contents removed by Pasteur pipette; and for examination of the adult flies, selected pupae are sterilized in sublimate solution before the adult emerges.

As regards the carriage of infection by adult flies, the author observed (using the same species of flies and bacilli) that if an infected fly be isolated in one unchanged cell it could remain infective for some time—in one case for 22 days; but that if it be frequently changed into fresh clean cells it became clear of its infection in 8 to 10 days.

A. A.

NEWSTEAD (R.) & EVANS (Alwen M.). **Report on Rat-Flea Investigation.**—*Ann. Trop. Med. & Parasit.* 1921. Sept. 30. Vol. 15. No. 3. pp. 287–300. With 4 charts.

Five species of fleas were found on rats from the ships, port, and city of Liverpool, namely *Xenopsylla cheopis*, *Ceratophyllus fasciatus*, *Leptopsylla musculi*, *Ceratophyllus londiniensis*, and *Ctenocephalus canis*. A permanent colony of *X. cheopis* was discovered in warehouses in the docks. *C. fasciatus* was abundant. *L. musculi* was not uncommon on dock rats, but occurred rarely on ship rats. Of *C. canis* only one specimen was observed.

A. A.

PATTON (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part V. Some Miscellaneous Arthropods.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 253–256.

Pulex irritans is extremely common in Arab villages. *Ctenocephalus canis* is common on dog and cat. *Cimex hemiptera* (= *rotundatus*) occurs only in Busra and Baghdad, and has been introduced by Indians. Lice are not absent. The following ticks were collected: *Argas vespertilionis*, found at different times on tents, furniture, and clothes; *Rhipicephalus sanguineus*, common on pariah dogs; *Boöphilus annulatus*, very abundant on cows and buffaloes; *Hyalomma aegyptium*, on almost every dromedary. *Haemaphysalis bispinosa* on calves; and *H. flava*, on dogs.

A. A.

AWATI (P. R.). **Some Notes on** *Conorhinus rubrofasciatus* **(De Geer).** — *Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 371–373.

When DONOVAN suggested *Conorhinus rubrofasciatus* as a possible agent in transmitting the kala azar parasite, it was objected [but the objection was not even then in accord with fact] that that insect had never been found in houses. Awati here reports the finding, recently, of adults, nymphs, and larvae of *Conorhinus rubrofasciatus* in Assam, in infected as well as in uninfected houses. The insects were found in the fabric of the houses, in bedstead and bedding, and boxes, and also in pigeons' nests.

A. A.

DEL PONTE (Eduardo). Contribución al estudio del gen. Triatoma Lap.— *Rev. Inst. Bacteriolog.* 1920. May; 1921. Mar. Vol. 2. Nos. 5 & 6. pp. 729–744; 133–196. With 53 figs.

A full account of the anatomy and taxonomy of the bugs of the genus Triatoma, with a tabular synopsis and descriptions of the species.

A. A.

MONTANA. **The Montana State Board of Entomology. Third Biennial Report, 1917–1918, and Fourth Biennial Report, 1919–1920.** [COOLEY (R. A.), Secretary.] 1919. Jan. 60 pp. With 5 folding plans; and 1921. Jan. 44 pp. With 1 text fig. Helena Independent Printing Co.

These reports are occupied entirely with the Rocky Mountain Spotted Fever tick (*Dermacentor venustus*), its bionomy and its eradication.

In the Bitter Root Valley the principal hosts of the larva and nymph are small rodents, the commonest of which is the gopher or ground-squirrel; and in the adult stage the chief hosts are domestic animals (particularly cattle, horses, and sheep), though wild animals, such as the bear, the coyote, the larger rodents, and, above all, the mountain goat, also play a part.

Efforts have been concentrated considerably on destroying the hosts of the larval tick, particularly the ground-squirrel, by means of grain poisoned with strychnine. This has been done systematically by official agency, though owners may distribute the poison on their own land if they wish.

Destroying adult ticks by arsenical dipping of domestic animals has also been provided for, but there are some practical difficulties in carrying it out; animals grazing at large cannot always be collected, and dipping cannot be done at all in the cold and wet spring weather.

Repelling adult ticks from domestic animals seems to be a promising move. It had been noticed that healthy animals with plenty of grease in their skin are seldom infested, and also that applications of kerosene or turpentine and lard for keeping off lice also keep away ticks for a long time; consequently applications of cotton-seed and linseed oil were tried and were found to have a good result.

By prohibiting grazing on grounds known to be infested with ticks or with ground-squirrels it is expected that ticks may suffer fatal deprivation. But mere burning of tick-infested pastures is said to be of not much use—though farmers believe in it—as it does not kill all the ticks present.

In Eastern Montana, where the tick has a wider range, other hosts of the larval and nymphal tick are deer-mice, field-mice, porcupine, and the jack-rabbit, which last also harbours the adult tick.

The original source of the infection has not yet been determined; several rodents are susceptible to infection, the snow-shoe rabbit more than others.

The question whether these measures for eradicating the tick can have a permanent effect is discussed at some length, the conclusion being that they will when the original source of the infection is discovered. For the present, perseverance in the measures outlined above, transferring live stock to tick-free and squirrel-free tracts, converting present pastures into cultivated and fenced fields, and education of the farmer are advocated.

A. A.

PARKER (R. R.). **The Control of Rocky Mountain Spotted Fever in the Bitter Root Valley. A Statement for the Information of Persons residing in the Infected Areas.**—20 pp. The Montana State Board of Entomology. 1921. Mar. Circular 1, Revised.

Contains regulations for the control or eradication of *Dermacentor venustus*, and explanations of the principles upon which they are based.

A. A.

MCCORNACK (P. D.). **Paralysis in Children due to the Bite of Wood-Ticks.**—*Jl. Amer. Med. Assoc.* 1921. July 23. Vol. 77. No. 4. pp. 260–263.

After a general review of the subject, with references to original papers, the following cases are recorded:—

1. A robust young woman of 22 years: when examined she had been unable to stand or walk or feed herself for three weeks, and could not hold her head up properly. A large wood-tick was found over the coccyx and removed. Recovery was complete in three days.

2. A girl of two years: when examined the legs were completely paralysed. The mother had removed a large tick from the head just before the examination. Recovery complete next day.

3. A boy not quite two years old: when examined he could not walk or pick up objects. A tick was found on the temple. Recovery followed removal.

4. A girl of four years: the symptoms were restlessness and abdominal pain, followed by severe pains in the knees and inability to stand. A large tick was removed from above the ear, and recovery followed on the sixth day, some enlargement of the cervical glands persisting.

5. A girl of five years: could not stand, or put her foot on the ground for pain; could not hold her head up properly or speak plainly, and had some difficulty in swallowing. A large wood-tick was removed from the occiput, and recovery followed in about a week.

6. A girl of eight years: felt dizzy, staggered, and dressed with difficulty, speech was affected, seemed irrational at times. A tick, identified as *Dermacentor venustus*, was found in the right axilla. Immediate improvement followed its removal, but a large necrosed spot remained.

7. A girl of five years: sickness was followed by difficulty in breathing, total paralysis of arms and legs, inability to speak and swallow,

and semi-stupor. A gorged wood-tick was found on the scalp, but after its removal the child died of bulbar paralysis in fourteen hours.

[In another case reported it is not clear that the symptoms were occasioned by tick-bite, as nothing but a suspicious wound was found.]

8. A boy of seven years: unable to stand, vomited, temperature subnormal and legs cold. After removal of a tick from the scalp, recovery soon followed.

9. A girl of nine years. Symptoms: dizziness, vomiting, inability to stand. A large wood-tick was found in the scalp. Recovery was slow.

10. A girl of four years died before being seen. She had been drowsy and had lost her appetite. A large wood-tick had been found in her head, but had not been removed completely. During the night she had been found in a state of dyspnoea, and died soon afterwards.

11. A girl of six: refused food, was dizzy, and could not walk steadily. Recovered seventy-two hours after removal of a tick from the scalp.

Most of these cases occurred in Idaho and Washington, one in Montana.

A. A.

KHALIL (M.). **On the Occurrence of the Eggs of Mites in the Faeces of Miners in Cornwall and their Subsequent Development on Culture Media.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Diseases and Parasit.). 1921. June. Vol. 14. No. 8. pp. 24–25.

The eggs were found in the faeces of 10 out of 130 men examined at Camborne. They were hatched in the laboratory and ultimately gave issue to adults of *Aleurobius farinae* and *Glycyphagus* sp.

A. A.

GOMES (João Florencio). **Da acção do sôro anti-botropico sobre a intoxicação experimental pelo veneno da** *Lachesis lanceolatus*. [The Action of Anti-bothropic Serum in Experimental Intoxication by the Venom of *Lachesis lanceolatus*.]—*Bol. Soc. Med. e Cirurg. de S. Paulo.* 1920. May. Vol. 3. No. 3. pp. 75–82.

Anti-bothropic serum (anti-venom) is serum immunized to the venom of *Lachesis lanceolatus*, *atrox*, *alternatus*, *neuwiedi*, and *jararacussu*.

The interesting points about the experiments are that dogs which, after they had received a lethal dose (1 mgm. per kilo of body-weight) of the venom of *Lachesis lanceolatus*, received equivalent subcutaneous injections of this anti-bothropic anti-venom one hour subsequently, all recovered, whereas if the treatment were delayed for two or for four hours survivals fell to 50 per cent. and 36 per cent. respectively; and that no better results, to say the least, followed intravenous injection of the anti-venom, while the results of intramuscular injection were very much inferior.

All the experiments are tabulated in detail.

A. A.

TEMBE (R. S.). **Short Notes on Two Cases of Snake-Bite,** *Echis carinata* **(Phoorsa).**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. p. 218.

In both cases the snake was well grown and was properly identified, in both cases some marks of fangs were visible, in both cases the

symptoms recorded were mainly local -acute pain and intense and far-spreading swelling—and in both cases treatment was followed by uneventful recovery. [The season of the year is not recorded.]

A. A.

CATAN DE HOUSSAY (María Angèlica). **Adsorción de los venenos de serpientes por el carbón.**—*Rev. Inst. Bacteriolog.* 1921. Mar. Vol. 2. No. 6. pp. 197–231. With 8 figs. [Summary in English.]

The conclusions of this experimental paper are that the haemolytic substance of snake-venom is adsorbed by animal charcoal, but not in accordance with any known law.

The antitoxic serum is not adsorbed. In mixtures of serum and venom in excess the presence of free haemolysin cannot be demonstrated, and in adding varying quantities of haemolysin to the liquid it is only medium doses, not very large doses, that are active; moreover, after adsorption of the venom the liquid still contains a substance which, though not haemolytic, yet neutralizes the anti-haemolysin: it is this substance *plus* that adsorbed by the charcoal that constitutes the haemolysin.

A. A.

KOBAYASHI (Ch.). **On the Application of Calcium Chlorid to Viper-Bites.**—*Japan. Ztschr. f. Dermat. u. Urol.* 1921. Feb. Vol. 21. No. 2. [In Japanese, pp. 144–149. English summary, pp. 7–8.]

Nine patients "bitten by vipers" were treated with calcium chloride, 20 cc. of a 3 per cent. solution being injected intravenously daily for six to ten days, and the pain and local inflammation were greatly relieved. [The summary contains no particulars of the species of vipers, diagnostic features of bites, moment of surgical intervention, etc.]

A. A.

BAYLEY-DECASTRO (A.). **The Poison of the Scolopendridae—being a Special Reference to the Andaman Species.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 207–209. With 2 text figs.

In the author's experience in India and Burma the wound inflicted by a centipede is not very serious, whereas the wound of the large centipedes found in the Andaman Islands is not only extremely painful, but also causes intense local inflammation of the skin and subcutaneous tissues, which may be followed by extensive gangrene; sometimes some amount of lethargy and stupor is also observed.

The author gives photographs of an illustrative case, where, as the result of a wound in the calf inflicted by an Andaman centipede, a process of sloughing was quickly set up which extended over the greater part of the inner surface of the calf and laid the muscles bare, the inflammation ultimately spreading below the ankle.

Some rough but interesting experiments on animals are also recorded, showing the effects of the venom. Guinea-pigs died in 7½ minutes and 2 hours and 35 minutes; a duck died in 10 minutes; the leg of

a drake "bitten" in the thigh became paralysed in about 10 minutes; a pup, bitten in the lip, showed a little blood in the urine in the course of its sufferings.

The author states that he failed to get any toxic effects, or indeed to get any venom, from young centipedes.

A. A.

SUZUKI (Tatsuo). **Experimentelle "Habu"—Gift-Nephritis.**—*Mitt. a. d. Pathologischen Inst. der Kaiserlichen Univ. z. Sendai, Japan.* 1921. Vol. 1. No. 2. pp. 225–242.

——. **Experimentelle Studien ueber die chronische Nephritis, welche aus der akuten hervorgeht. (Zweiter Bericht ueber Habugift-Nephritis.)**—*Ibid.* pp. 243–292.

Habu is the vernacular name of the Crotaline snake, *Lachesis flavoviridis*, and these two papers contain an account in very minute detail of the pathological changes experimentally produced in the kidney by the intravenous injection of the venom of this snake. These changes start in the capillaries of the glomeruli and not in the epithelium of the tubules, and the chronic nephritis which follows the experimentally-produced acute nephritis is generally more or less haemorrhagic.

A. A.

EVANS (H. Muir). **The Poison Organs and Venoms of Venomous Fish.**—*Brit. Med. Jl.* 1921. Oct. 29. pp. 690–692. With 2 text figs.

Among the definite statements contained in this rather discursive paper, two may be noted, namely, (1) that the venomous secretion of the spiny dogfish causes oedema locally and paralysis generally, but is not haemolytic; (2) that the venom of the weever, besides causing local extravasation and necrosis and being haemolytic—as is well known—also causes paralysis, and in addition affects the leucocytes, the effect being seen in vacuolation, defective staining, and 25 per cent. impotence against bacteria.

A. A.

SLEEPING SICKNESS.

DUKE (H. Lyndhurst). **On the Zoological Status of the Polymorphic Mammalian Trypanosomes of Africa and their Relation to Man.** — *Parasitology*. 1921. Nov. Vol. 13. No. 4. pp. 352–397. With 1 text fig.

In this long but interesting paper the author endeavours to prove that the polymorphic mammalian trypanosomes of Africa all belong to a single species and not to a multitude of species. The species is characterized by its polymorphism in its vertebrate hosts, and its anterior station in the salivary glands of its Glossina intermediary. Included in this species there are many different varieties or strains, distinguishable from one another by characters of minor systematic importance. These strains are not immutable, but variable, and are determined by the environment in which the species lives; they are not constant, under varying external conditions, but each different strain is dependent upon, and is produced as a response to, a particular environment. If we call this species *Trypanosoma brucei*, then *T. gambiense*, *T. rhodesiense* and *T. nigeriense* are to be regarded as particular strains of *T. brucei*, which have become, after sojourn in other hosts, more or less adapted to life in the blood of man.

This conclusion is based on considerations of the following nature :—

G. palpalis is essentially not a game tsetse in the sense that *G. morsitans* and *G. pallidipes* are. Its main food animals under primitive African conditions are reptiles, possibly birds, man and his stock, the hippopotamus, and such game as may visit its haunts.

The polymorphic trypanosomes so far recovered from game, stock and man in inhabitated *palpalis* areas resemble *T. gambiense* rather than *T. brucei* as regards pathogenicity and the absence of posterior-nuclear forms. With one certain and one doubtful exception, wherever the *brucei* type of trypanosome has been recovered from game or stock in a *palpalis* area, other tsetse species have been present. The only two instances where a trypanosome possessing the characters of the *brucei* group has been recovered from a pure *palpalis* region occur in areas which have for years been uninhabited by man, and where antelope abound, viz., the Sesse Islands and Kiraro Lake near Lake George. In no other region of Africa does antelope play such an important part in the dietary of *G. palpalis* as on the Sesse Islands, where, consequently, the polymorphic trypanosomes have antelope for their almost exclusive host.

In neither the wild fly nor the antelope of these islands have trypanosomes of the *nanum-pecorum* type ever been detected, but *T. vivax* and *T. uniforme* are common in buck and fly. In addition, in both are found the polymorphic organism described from Damba.

Between 1901 and 1909 *T. gambiense* was present in the blood of an enormous number of human beings, and it is certain that a relatively large percentage of the wild fly must have been cyclically infected with this parasite. With the removal of man and stock, the antelope and hippopotamus were increasingly drawn upon by the fly for blood. It is known that *T. gambiense* will survive for many months in the blood of sitatunga, and from 1909 it and the hippopotamus must have constituted the reservoir of the parasite. The numbers of antelope are now enormous, and their relation to fly is very intimate. In 1912 the fly and sitatunga were still carrying a trypanosome resembling *T. gambiense*, and the author believes that "there appears to be no

reason to doubt that the polymorphic trypanosomes in the sitatunga and wild *G. palpalis* in the prohibited area of Lake Victoria at the present day are the descendants of the *T. gambiense* which occurred in man at the time of the epidemic."

At the present day certain wild strains differ from those of 1912, notwithstanding that there has been no introduction of fresh strains from outside. Significant variations have been noted in the virulence and morphology of the trypanosomes from Damba, tending towards the characters typical of *T. brucei*. Duke believes that had this parasite existed in 1912, it is incredible that its presence should not have been detected; posterior-nuclear forms certainly did not occur in the 1912 antelope strain. "It appears reasonable, therefore, to regard this newly-recognized *brucei*-like organism as a strain or variety of the older and formerly more common trypanosome, whose general behaviour so strongly resembled the human parasite, *T. gambiense*."

Whether or not, simultaneously with the acquisition of these minor changes, these strains have lost their capacity for survival in man is a question of importance. It is conceivable that those species of trypanosomes which possess the power of utilizing man as a host may lose this power if maintained for sufficiently long periods under natural conditions exclusively in ruminants. The present close relationship between fly, trypanosome and game on Damba are parallel to those existing in *morsitans* country, and "it is possible, therefore, that the prolonged sojourn of a polymorphic trypanosome exclusively in game animals through many generations may result, *per se*, in the assumption by the parasite of the characteristics of the trypanosome known as *T. brucei*, irrespective of the tsetse species concerned with its transmission." These considerations suggest that the differences between *T. gambiense* and *T. brucei* depend upon the predominance in *T. gambiense* areas of hosts other than ruminant game, *i.e.*, man, and possibly hippopotamus and reptiles also.

Besides considering the effects produced upon the trypanosome by sojourn in different vertebrate hosts, we must also take into account the possible effect produced by sojourn in different species of Glossina. We know that *T. gambiense* is transmissible by *G. morsitans*, and *T. brucei* by *G. palpalis*, but we do not know whether after a suitable number of experimental passages through the normally foreign tsetse species *T. gambiense* acquires increased, and *T. brucei* diminished, virulence to laboratory animals; in other words, whether the differences between *T. gambiense* and *T. brucei* are determined by the species of tsetse concerned with transmission. While the matter is obviously susceptible of direct experimental proof, there is at present no certain evidence to prove that the invertebrate host determines—or influences—the characters of the trypanosomes which it is capable of transmitting; and the evidence supplied by the discovery on Damba is against such a supposition.

W. Yorke.

CLAPIER (P.). **Évolution et état actuel de la trypanosomiase humaine dans le Secteur de prophylaxie no. 11 (Moyen-Congo).**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 405–423.

The object of this work is to show the evolution of sleeping sickness in the region of the middle Congo, known as Sector No. 11, from the first investigations of MARTIN, LEBOEUF and ROUBAUD (1907), and of HECKENROTH (1909), right up to the present time. The author's

previous article on the Bangala [this *Bulletin*, Vol. 17, p. 323] constitutes the first portion of this study. The personal figures relate to all infected cases living on the occasion of the last visit to each region of the sector. Except for 170 cases diagnosed clinically, all the diagnoses were parasitological. The population of 220 villages and groups of villages has been wholly examined on several occasions.

In all the regions the disease affects children much more than adults: thus, of a total population of 11,417, comprising 993 patients, we have 7,509 adults, of which 259 are infected (3·4 per cent.), and 3,908 children, of which 734 are infected (18 per cent.). Except in Babolé, where the disease is not very intense, one out of every three children is infected. In each of the hundred odd villages examined, the number of children infected is always greatly above that of the adults, generally five or six times as much. In a previous paper on the Bangala [*loc. cit.*], the author has attempted to show that in countries where trypanosomiasis has become almost completely extinguished in a few years and in those countries where an epidemic is still recent, the disease attacks equally men, women and children. As regards the region under consideration in this paper, the author produces evidence to suggest that the disease is of old standing, and then states that if the chances of infection are equal for adults and children, one can only explain the light infection among the former as a result of immunization. The hypothesis has been advanced that the children are more heavily infected than the adults, because they are more exposed to the bites of the tsetse. The author shows, however, that there is no reason to believe that this is really the case. In his view the problem can be explained if one admits that in this country where trypanosomiasis has long existed in an endemic form, the old people and adults enjoy a degree of immunity due to an increase in the resistance of the body as the result of feeble inoculation.

It is interesting to recall what happens in this country when contingents of troops are introduced into an endemic area. OUZILLEAU gives examples of much more intense infection among a detachment of foreign soldiers than among the autochthonous adults. Clapier records that between November 1919 and August 1920 he visited one or more times the 32 militiamen who had sojourned in Epéna for periods varying from some months to three years. Among them he discovered seven cases (21 per cent.) of sleeping sickness; all these men had been examined before leaving Brazzaville and declared free from infection. In the most heavily infected villages of this district, the indigenous adults were infected only to the extent of 3 to 6·7 per cent. The author points out that these militiamen lived under much better conditions than the indigenous people, their work was light, they were well clothed, slept under a mosquito net and were well fed. These facts indicate a relative immunity on the part of the adult native. The fact that a very great number of children reach between four and ten years of age suggests that this is the period of life when immunity is acquired. Is this not also the case in yellow fever, yaws and malaria? Possibly the relative immunity to trypanosomiasis is really a tolerance in respect of very rare parasites only discoverable with difficulty; the anti-bodies produced in response to this attenuated infection render the organism refractory to new infections. If this is so, it explains the frequent occurrence of auto-agglutination in endemic zones.

In the Yessoua and Bocabonga country on the upper and middle Motaba and Ibenga, the disease has retrogressed since 1912 along

the upper rivers where the natives are rather isolated and tsetse rare, and it has increased along the middle and lower rivers where the tsetse is very numerous.

The author records some interesting observations on the frequency with which parasites can be found in the peripheral blood among cases of sleeping sickness from various localities. Among 93 cases of the disease (diagnosed by gland puncture) trypanosomes were found in the blood of 19 (20 per cent.); the details are as follows: among 57 cases coming from villages where the percentage of infected was less than 15, trypanosomes were found in the blood of eight (14 per cent.); among 36 cases coming from villages where the percentage of infected was more than 15, trypanosomes were found in the blood of eleven (30 per cent.); and among nine cases from the Bandja villages where the percentage of infected was 19, trypanosomes were found in the blood of five (55 per cent.). The conclusion from this work is that the parasites are found very often by simple direct examination of the blood in places where the disease is in an epidemic form. Reference is made to the fact that HECKENROTH found trypanosomes by direct examination of the blood in 32 per cent. of cases in the Sangha district and LEBOEUF in 37 per cent. of cases in the Oubangui.

W. Y.

BAUVALLET (H.). **Sur un cas de Trypanosomiase humaine à la Basse Côte d'Ivoire.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 326–328.

A brief record of a case of sleeping sickness in a creole, who presumably contracted the disease in the neighbourhood of Bondoukoul whither he had obtained a permit to go in June 1920; until this date he had never been out of the Ivory Coast. The patient was treated with atoxyl and novarsenobenzol and so far as the observation period went had not relapsed.

W. Y.

BASSETT-SMITH (P. W.). **Trypanosomiasis.** *Jl. Trop. Med. & Hyg.* 1921. Apr. 15. Vol. 24. No. 8. pp. 105–108.

A semi-popular description of the disease containing an account of a case which came under the charge of the author and details of which have appeared elsewhere from time to time.

W. Y.

CLAPIER (P.). **Constatation de *Trypanosoma gambiense* en grande abondance dans le liquide d'hydrocèle.** *Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 378–380.

In August 1920, at Enyèle on the Ibenga, the author came across an old man of about 60 who was suffering from elephantiasis of the scrotum complicated by extremely voluminous bilateral hydroceles. On puncture of the hydroceles a lemon-yellow, almost transparent, fluid escaped; on examining this microscopically several trypanosomes were found in each field, and occasional lymphocytes and small mononuclear cells. A similar state of things was seen in hydrocele fluid of another case, also about 60 years, from the village of Golo.

Commenting on these two cases, details of which are given, Clapier states that it is very rare to find *T. gambiense* in such great abundance by direct examination, even during the febrile periods; he has only

seen a single case when trypanosomes were observable in coverslip preparations of the blood in almost every field, and that was in a man recently infected who exhibited no auto-agglutination of the red cells. It appears that the hydrocele fluid is a very favourable medium for the development of *T. gambiense*. The almost complete disappearance, within a night, of the parasites from the hydrocele fluid in the second case after puncture suggests that the slight traumatic shock of the puncture had resulted in a trypanolytic crisis possibly due to exudation of serum from a small haemorrhage.

W. Y.

REICHENOW (Eduard). **El paralelismo entre la enfermedad del sueño y la sifilis cerebro-espinal y su valor para el pronóstico y la terapéutica.** [Parallelism between Sleeping Sickness and Cerebrospinal Syphilis and its Value in Prognosis and Treatment.]—*Bol. Inst. Nac. Higiene de Alfonso XIII.* 1917. Sept. 30. Vol. 13. No. 51. pp. 199–218.

A translation into Spanish of an article by Reichenow in German. The author points out that though there is a lack of evidence in support of SCHAUDINN's theory of a close biological relationship between trypanosomes and spirochaetes, there are many close analogies between sleeping sickness and syphilis. Both have a primary and secondary phase, the former, in which the disease is mainly an affection of the blood, responding to treatment, while the latter, in which the parasite has attacked the central nervous system, is recalcitrant, in the case of sleeping sickness completely so. The non-success of atoxyl or salvarsan treatment in the secondary phase is due to the fact that the parasite multiplies in the cerebrospinal fluid and that the drug injected does not penetrate the meninges. Intraspinal injection has been suggested and tried, but without success. In this connexion the observations of TUSZEWSKI (1914) are significant. He found that in animals injected intraspinally with trypanblue the colouring matter spread in the cerebrospinal fluid up to the base of the brain and as far as the frontal lobe, tinging the meninges deeply. It did not, however, spread to the convexity of the brain, nor to the ventricles or their fluid. The author suggests the use of drugs which have the power of penetrating the meninges and so reaching the central nervous system. He has himself experimented with alcohol and with urotropine, and gives a brief résumé of his experiments with the latter drug, promising a more detailed account later. The patients, in all of whom the existence of trypanosomes in the cerebrospinal fluid had been proved, were given 6 gm. of urotropine at fortnightly intervals until 48 gr. had been given. The effect on lymphocytosis in the cerebrospinal fluid was in all the cases—four in number—very marked, the fluid in one case being normal in that respect at the expiration of the treatment. This patient who, in spite of the presence of parasites in the cerebrospinal fluid, was free from nervous symptoms, remained so after treatment. In the other three, in whom the disease was clinically very advanced (ataxia, somnolence, psychic defects), definite improvement was observed in one only. The author considers that his results with urotropine encourage to a further and more extended trial of the drug in cases in which no grave damage has yet been done to the nervous tissue.

F. S. Arnold.

REICHENOW (Eduard). **Ueber** *Trypanosoma gambiense* **im Liquor cerebrospinalis des Menschen.** [On *T. gambiense* in the Cerebrospinal Fluid of Man.]—*Berlin Klin. Woch.* 1921. Mar. 14. Vol. 58. No. 11. pp. 251–253.

The pathogenic action of *T. gambiense* is quite different in rats and mice and in men. The former succumb sooner or later to the blood infection, which is extraordinarily heavy, whilst in the latter the parasites are much more scanty in the blood; in old cases of the disease in man very often trypanosomes are no longer to be found there. No human being dies from blood infection of *T. gambiense*, but what makes trypanosomiasis so fateful a disease in man is that sooner or later the parasites penetrate the central nervous system and there exercise their pathogenic action. The parasites do not succeed in entering the cerebrospinal fluid for a long period, as a rule several months after infection.

Examination of the cerebrospinal fluid of numerous cases of sleeping sickness in the Cameroons revealed two points of special interest: the first concerned the parasites and the second the cell increase. As regards the first, it was observed that the trypanosomes in the cerebrospinal fluid were characterized by their especially slender form; the most striking appearance was, however, the great number of division forms which were encountered in the cerebrospinal fluid. In old-standing cases of sleeping sickness 2 to 6 per cent. of the trypanosomes in the blood were division forms, whilst in the cerebrospinal fluid divisional forms represented an average of 10 per cent. of the total trypanosomes and, rarely, as much as 19 per cent. The number of parasites found in the individual cases varied greatly: in 37 per cent. of cases 1 cc. of cerebrospinal fluid contained 0·1 to 1 trypanosome, in 16 per cent. of cases 1·1 to 2 trypanosomes, in 7 per cent. of cases 2·1 to 3 trypanosomes, and so on, until the highest number of trypanosomes found in 1 cc. was 200. Occasionally, less than 1 trypanosome was found in 10 cc. of fluid, but such cases were rare. Whereas trypanosomes were found in 71 cases, in 9 only a cell increase was discovered. Repeated punctures showed that the number of trypanosomes per 10 cc. of spinal fluid remained for long periods remarkably constant in the individual cases. This absence of periodicity is due to the lack of trypanocidal antibodies in the spinal fluid.

How is it that, notwithstanding the intense reproduction which goes on in the spinal fluid, the number of parasites remains so constant? It is the cell increase which is responsible for limiting their number. The cell increase is a lymphocytosis; in addition to typical lymphocytes, there are present in greater or smaller numbers peculiar cells with a large vacuole, designated in the literature "mulberry cells." These cells are really changed lymphocytes. In preparations of spinal fluid containing numerous trypanosomes the parasites can often be seen attached to lymphocytes. According to the author, the trypanosomes, although they are killed by the lymphocytes, are not ingested, but undergo lysis in the spinal fluid, thus giving rise to the toxin which produces the nervous changes.

The degree of lymphocyte increase varies greatly in the individual cases, and corresponds in no way to the number of trypanosomes. It was found, however, that the gravity of the symptoms varies with the number of parasites in the spinal fluid: in cases exhibiting marked lethargy the parasites are always numerous, whereas, when the sleeping sickness symptoms are lacking, the parasites are very scanty.

In a previous communication [this *Bulletin*, Vol. 15, p. 386] the author has shown that the ordinary administration of such drugs as atoxyl, salvarsan, neosalvarsan, trixidin and trypasafrol has no effect on the spinal infection. The parasites in the cerebrospinal fluid can be attacked in two ways, first by intraspinal injection of drugs, and second by the ordinary administration of such drugs as penetrate the central nervous system. By the former method the author succeeded in causing decrease or disappearance of the parasites, but they soon reappeared.

As regards the second method, the author has already recorded his unsuccessful attempt with alcohol. In later experiments he used urotropine, which he combined with atoxyl; the patients were given every two weeks on two consecutive days atoxyl 0·5 gm. and urotropine 3 gm. In this manner a cure was obtained in five cases, in one case atoxyl had no action on the blood infection, and in all other cases and after conclusion of treatment a marked decrease in the number of parasites and lymphocytes in the spinal fluid was observed. The experiments were interrupted by the war.

W. Y.

CONRAN (Philip). **Intermissions in Trypanosomiasis.** [Correspondence.]—*Brit. Med. Jl.* 1921. June 18. p. 916.

When in medical charge of the sleeping sickness area of Nyasaland in 1913 the author came across a child, aged seven, whose blood showed a heavy infection of *T. rhodesiense*. Notwithstanding the fact that no treatment was given, many subsequent examinations of the blood were negative until about a year later, when the parasites reappeared, and death followed shortly afterwards. The author remarks that the occurrence in untreated cases of such long negative periods makes one hesitate before accepting MARSHALL's cases as cured until a long period has passed without relapse.

W. Y.

MURRAY (William A.). **History of the Introduction and Spread of Human Trypanosomiasis (Sleeping Sickness) in British Nyasaland in 1908 and Following Years.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Oct. 20. Vol. 15. No. 4. pp. 121–128. With 1 map.

The author, who has been in Nyasaland (Mvera Mission) since 1901, recalls that he dissented strongly from the conclusion reached by the Royal Society Commission, viz., that sleeping sickness has not been introduced into Nyasaland from Tanganyika, but is an endemic disease of the country. In this paper he states his reasons for believing that there was no sleeping sickness in Nyasaland prior to 1907 or 1908, and that the disease was introduced about that time from Lake Tanganyika or Northern Rhodesia or from both.

Nyasaland Government officers had during 1907 and 1908 examined over 60,000 natives for enlargement of glands, and the blood of all sick natives or those with enlarged glands in the tsetse-fly area within the Protectorate, without finding a single case of sleeping sickness until October 1908. For many years previously the Government and Mission doctors scattered throughout Nyasaland (about 30 in all) had examined many thousands of sick natives annually and not a single case of sleeping sickness had been discovered.

Details are given of a few of the earliest cases which were discovered in Nyasaland, and Murray is of opinion that there is reason to believe that these contracted their infection outside Nyasaland.

The first case in Nyasaland was discovered at Nkata Bay in October 1908. The patient gave a history of having travelled the previous year in Tanganyika and the Congo; his type of infection was not determined, but was probably *T. gambiense*, as he lived for at least three years after in excellent health. On the discovery of this case an isolation camp was established at Dowa, and the patient was taken to Domira Bay by steamer, and then conveyed in a hammock (unscreened) through 25 miles of *morsitans*-infested country to Mvera and thence to Dowa. Murray's opinion is that the first infection of fly (with the human trypanosome) along that road occurred on this occasion. The second case of the disease was that of Dr. H., who accidentally infected himself from the first case in November 1908. Shortly afterwards, before recognizing his true condition, Dr. H. journeyed along the Mvera-Maganga road to search for tsetse other than *G. morsitans*, but after about a week was so ill that he had to return to Dowa; he died shortly afterwards. The third case was found at Kota Kota in May 1909, and gave a history of having been on the Luapula; he also was taken to Domira Bay, and thence via Mvera to Dowa without precautions.

The locality of the infection could not be discovered in cases 4 and 5, but cases 6, 7, 8 and 10 had been in or near the Luangwa Valley in 1909. Case 11 was the first case found locally infected, he had never been out of the Mvera-Domira Bay district.

Two medical officers were now detached to examine the district thoroughly, and thirty further cases were found within a 20 miles radius of Domira Bay. The inhabitants of the contiguous fly district north and south were also carefully examined, but no case was found until several months later, and gradually the disease spread until by 1915, practically the whole of the *morsitans* area of Nyasaland was found to contain infected fly, game and natives. Between 1908 and 1919 about 250 cases were discovered. It would now seem that the pathogenicity and spread of the epidemic have diminished and that few cases are to be found.

The author concludes by stating that he thoroughly concurs in the view of Sir David Bruce's Commission as to the highly important rôle played by the larger varieties of game in the dissemination of the disease in Nyasaland, and in acting as a permanent reservoir of all the trypanosomes pathogenic to man and domestic stock.

[This is rather a curious admission on the part of the author, as, in the reviewer's opinion, it seems to undermine his whole argument. Why labour in an attempt to show that a few infected human beings carried in unscreened hammocks through 25 miles of fly country are responsible for the introduction of the infection when presumably enormous numbers of infected game have been wandering about at large for years ?]

W. Y.

Nattan-Larrier (L.). **Maladie du sommeil et hérédité. Maladie du sommeil et gestation.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 3. pp. 65–71.

The only trypanosomes of vertebrates which may be hereditary are those of debab and of Chagas' disease [this *Bulletin*, Vol. 15, p. 46].

Sleeping sickness, without doubt, frequently occurs in young children, but to prove that it is hereditary the blood of the infant must be found to contain trypanosomes a few hours after birth. The author cited in detail an observation of THIROUX (*Sleeping Sickness Bulletin*, Vol. 1, p. 489) which demonstrated that an infected woman can give birth to a healthy child. Experiments are described which show that neither in the rat nor in the guinea-pig is *T. gambiense* transmitted from the mother to the foetus.

Regarding the effect of infection on gestation the author quotes the observations of THIROUX and LEBOEUF (*loc. cit.*), of AUBERT and of GREGGIO [this *Bulletin*, Vol. 7, pp. 103 and 104]. All these observations show, without doubt, the influence of the disease in producing abortions and miscarriages. It is impossible, however, to obtain from them precise information why sometimes gestation proceeds normally, at what period of pregnancy miscarriages occur, or what percentage of the births are premature. Apparently the abortions and premature births do not aggravate the disease in the mother.

Quoting from the same authors, Nattan-Larrier shows that methodical treatment of the mother lessens these accidents very materially, and for this reason, in order to increase the birth-rate in depopulated regions, periodic and adequate treatment is essential.

W. Y.

ROY (J. N.). **Des affections oculaires dans la syphilis et la trypanosomiase humaine chez les indigènes de l'Afrique.** -*Rev. Méd. et Hyg. Trop.* 1920. Vol. 12. No. 4. pp. 103–119.

The first part of this paper is a discussion regarding the probable manner of entry of syphilis into Africa.

Among 135 syphilitic natives especially examined from the point of view of ocular disease, lesions of the eye were found on only 16 occasions, and with a single exception the region involved was the anterior segment of the eye.

Eye lesions in natives suffering from trypanosomiasis were extremely rare: of 418 cases examined, only three were found to have deep-seated ocular lesions, and the etiology in these cases was doubtful. Details of these cases are given: in two who exhibited well-marked signs of meningitis there was a papillary oedema, possibly the result of the increase of cerebrospinal fluid; in the third case there was also a papillitis, and the general condition and the visual acuity rapidly improved under atoxyl treatment.

W. Y.

DE OLIVEIRA (Gastão). **Isolamento do "*Trypanosoma Cruzi*" e outras noções concernentes a Molestia de Chagas, no Rio Grande do Sul.** [Isolation of *Trypanosoma cruzi* and other Points concerning Chagas' Disease, in Rio Grande do Sul.]—*Brazil Medico.* 1920. Feb. 28. Vol. 34. No. 9. pp. 142–143; and *Arch. Rio Grandenses de Med.* Porto Alegre. 1920. Mar. Vol. 1. No. 2. pp. 73–76. With 1 text fig.

In April, 1919, Drs. Aristides DA CINHA, H. ARAUJO, BLESSMANN and ESTEVES, examining a specimen of *Triatoma infestans* (Klug), found large numbers of flagellates with the characters of *Trypanosoma cruzi*. The genus *Triatoma*, profusely distributed throughout the State of Rio Grande do Sul, is represented by three distinct forms – *infestans*

(Klug), *megista* (Burmeister) and *rubrovaria* (Blanchard). The country people call them "chupao" or "fincao"; the name "barbeiro" is unknown. *Triatoma infestans* excels the others greatly, both in numbers and in infectivity. It infests the whole State, and is, by reason of its highly infected and infective condition, the species most dangerous to the inhabitants. *Triatoma megista* is much less numerous. It is found chiefly about mud walls. It appears, in the State of Rio Grande do Sul, to be less adapted to life in human dwellings than is the case in other parts of the country. Of nine specimens received from Canoas, near the capital, six were collected out of doors and only two from beds. All were found, on examination, to be free from flagellates, a result of considerable interest from the point of view of the epidemiology of the disease, especially when taken in connexion with the fact that various specimens of *Triatoma infestans*, from the same locality, were found infected. Two specimens of *T. rubrovaria*—the only ones received—were also found uninfected. To facilitate the study of the geographical distribution of Triatoma species the author divides the State into zones—north, south, littoral and frontier (with Argentina and Uruguay), and gives, district by district, the name of the locally infesting Triatoma and the result of its examination for flagellates.

The district of Egrejinha is, states the author, a vast focus of bronchocele and infected bugs. "All the inhabitants," he says, "suffer from this deformity." The author would appear not to have found the trypanosome in the blood of any of the patients examined, a fact which he attributes to his having paid only a short visit to the infected zones and during the autumn.

F. S. Arnold.

NATTAN-LARRIER (L.). **Hérédité des infections expérimentales à** *Schizotrypanum cruzi.—Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 232–238.

The author points out that although acute Chagas' disease is most frequent in very young children, yet it has never been definitely settled whether the disease can be transmitted from the parent to the offspring. He decided to investigate the point, and carried out experiments on 26 female animals (25 guinea-pigs and one mouse) infected with the strain of *Schizotrypanum cruzi* maintained at the Institut Pasteur in LAVERAN's laboratory.

Abortions were common, and were observed in 19 of the 26 experiments—4 times in animals 30 days pregnant, 8 times between the thirtieth and fortieth days, and 5 times later than the fortieth day. Abortions then appeared to be equally frequent at all periods of gestation. They occurred often during the 20 days following inoculation.

On 11 occasions the author was able to make a satisfactory examination of the young of infected animals—four guinea-pigs were killed, and, to avoid contamination, the young removed from the uterus, with all precautions; three aborted; three gave birth at term, and one mouse also gave birth at term. The blood of the offspring was found infected on two occasions.

The conclusion then, is that in the guinea-pig the infection can pass from the mother into the amniotic fluid, and even to the foetus. The method by which this takes place the author hopes to discuss in a later communication.

W. Y.

NATTAN-LARRIER (L.). **La schizotrypanosomiase américaine peut-elle être transmise par contagion génitale?**—*C.R. Soc. Biol.* 1921. Apr. 30. Vol. 84. No. 15. pp. 773–775.

The fact is recorded that VIANNA found *Schizotrypanum cruzi* in the semen of two of six infected guinea-pigs, and Nattan-Larrier consequently inquires whether the introduction of the parasites into the vagina can infect the female. He conducted experiments with three mice, introducing into the vagina of each a small quantity of a dilute suspension of *S. cruzi*, all precautions being taken to prevent erosion of the vaginal mucosa. Infection was obtained in each case. In further experiments the permeability of the conjunctiva, of the intestinal mucosa, and of the skin, was examined. Results were negative in each case.

W. Y.

WEICHBRODT (R.). **Bayer 205.**—*Berlin Klin. Woch.* 1921. Jan. 10. Vol. 58. No. 2. pp. 34–35.

In order to determine what amount of this drug could be administered with safety to man, it was necessary to commence with quite small doses and to watch the urine and temperature carefully. As HÄNDEL and JÖTTEN [this *Bulletin*, Vol. 17, p. 333] have shown, the drug is active whether given intravenously, subcutaneously or orally. The drug causes a decrease in the coagulability of the blood, and when given in too large amount produces bleeding from the nose.

After several doses of 1 gm. albumen appears in the urine and persists for several days. Very frequently one observes a reddening of the face and there is a sense of well-being. If there is a rise of temperature, it disappears within 24 hours.

At first the drug was given intravenously in doses of 0·2 gm. five or six times within eight days. In only a single case did albumen appear in the urine, and then after the third injection. Later, 1 gm. doses were given, but a total amount of 3 gm. was not exceeded. Per os 3 gm. was given within 20 hours, and after such doses albumen appeared in the urine on the second day and lasted five days. The drug had no noticeable effect on general paralysis, nor on malaria or recurrent fever.

W. Y.

MAYER (M.) & ZEISS (H.). **Weiteres ueber die Wirkung von "Bayer 205" Serum (Menschenserum).** [A Further Communication on the Action of "Bayer 205" Serum (Human Serum).]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 149–150.

It has already been shown that cured and healthy animals which had been given "Bayer 205" remain protected against infection with trypanosomes up to a period of five months [this *Bulletin*, Vol. 17, pp. 333 and 334]. This is due to the fact that the drug remains for months in an active form inside the body and, indeed, can be demonstrated in the serum. The sooner after treatment the serum is removed, the greater its therapeutic effect, but complete cures have been obtained by the use of serum removed from an animal 51 days after the administration of "Bayer 205." In the work described in this paper the author investigated the question whether the serum of human beings treated with "Bayer 205" possessed a similar therapeutic action.

Serum was obtained from two infants and an adult. As the serum of normal adults exhibits a trypanocidal action against various

pathogenic trypanosomes of animals, viz., *T. brucei*, *T. equinum* and *T. equiperdum*, and also against *T. rhodesiense*, it was necessary to inactivate the adult serum by heating to 62°–65° C. for 15 to 60 minutes, in order to destroy this normal trypanocidal power. This procedure was unnecessary in the case of the infants' serum, as such serum does not normally exhibit any trypanocidal action.

The infants had received 1·8 gm. of "Bayer 205" orally in three days, and 6·95 gm. orally in 17 days, respectively. The serum of the first infant was given in a dose of 1 cc. to a heavily infected nagana mouse; it became negative for four days, and then trypanosomes reappeared and it died; similarly, 1 cc. of the serum of the second infant produced a negative period of nine days, but again trypanosomes reappeared and the animal died. In another case 0·6 cc. of the serum cured the animal.

The adult had received 22·4 gm. of "Bayer 205" in 16 days (8·2 gm. intravenously and 14·2 gm. orally as a powder). The serum was removed on the second and thirteenth days after the last dose of the drug. The second-day serum, in doses of 0·2 to 0·7 cc., cured animals infected with nagana, caderas and dourine; the thirteenth-day serum likewise effected cures, but only when larger (1 cc.) doses were given.

W. Y.

Mühlens (P.) & Menk (W.). **Ueber Behandlung von Menschlicher Trypanosomiasis mit "Bayer 205."** [On the Treatment of Human Trypanosomiasis with "Bayer 205."]—*Muench. Med. Woch* 1921. Nov. 18. Vol. 68. No. 46. pp. 1488–1489.

Details are given of two cases of human trypanosomiasis treated with "Bayer 205" [this *Bulletin*, Vol. 17, p. 333].

The first case came from Fernando Po, and was infected with *T. gambiense* in October, 1919; he exhibited slight attacks of fever, fleeting erythema, enlargement of lymphatic glands, and trypanosomes in the peripheral blood. In March, 1920, he arrived in Hamburg, and was treated with "Bayer 205." The treatment consisted of an intravenous injection of 0·2 gm. of the drug; the treatment was well borne, and trypanosomes disappeared from the blood for a few days, but soon reappeared. After an interval of seven days a second injection of 0·2 gm. was given. This had but little effect, trypanosomes increased in number, and the patient was consequently put on tartar emetic treatment; shortly afterwards he returned to Africa and was lost sight of.

The second case was that of a European (G. J.) infected with *T. rhodesiense*, and sent by the reviewer to Hamburg for treatment with "Bayer 205." The patient contracted the disease in the Serinje district of N.E. Rhodesia in September, 1920. He was treated with intravenous injections of tartar emetic, intramuscular injections of antimony oxide, and subcutaneous injections of soamin. As the result was not very satisfactory, 13 injections of stibenyl were given at the beginning of January, 1921, but this was soon abandoned as useless and the previous treatment recommenced. In March the patient returned to England and was treated at the Liverpool School of Tropical Medicine, by the reviewer, with intravenous injections of tartar emetic and subcutaneous injections of atoxyl. As, however, the condition became steadily worse and the infection appeared to be resistant both to antimony and to arsenic, the patient was sent to Hamburg at the beginning of July for treatment with "Bayer 205."

During the eight and a half months he had been ill he had received in all 22·7 gm. of tartar emetic. Shortly after arriving in Hamburg, on July 9, the patient had a rigor and trypanosomes were present in the peripheral blood. Treatment with "Bayer 205" was commenced immediately; an intravenous injection of 0·5 gm. was given, and the two following days intravenous injections of 1 gm. The injections were well borne, the fever subsided within six hours, and the trypanosomes practically disappeared from the blood; the urine remained normal. After an interval of seven days, during which time the blood examinations were negative, a further injection of 1 gm. was given. As, however, this was followed by the appearance of small quantities of albumen in the urine, no further injections were given. From this date until the patient left Germany, two months later, the blood remained negative. The condition of the patient improved greatly, there were no further febrile disturbances, and the weight increased considerably.

W. Y.

YORKE (Warrington). **The Treatment of a Case of Rhodesian Sleeping Sickness by the Preparation known as "Bayer 205."**—*Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 479–482.

Here we have another record of the case of G. J., containing additional details of the early history of the infection and an account of the treatment at Liverpool and Hamburg. The patient was seen at Liverpool after his return on September 15, when he was remarkably improved and his weight had risen from 132 to 145 pounds; the urine contained a trace of albumen. He returned for examination on November 5. On this, and on the previous occasion, the blood examination and subinoculated rats were negative. There was no autoagglutination nor any sign of the disease. On November 11 he returned to South Africa. Professor Yorke writes:—

"The above record is of peculiar interest, as it relates to the first case of human trypanosomiasis treated with adequate doses of "Bayer 205." Whilst recognizing that hasty and premature claims of success in the treatment of a disease like sleeping sickness are to be deprecated, and that the further history of the patient alone can decide whether a real *therapia sterilisans magna* has been effected, the facts that the disease was of at least eight and a half months standing at the time of treatment with "Bayer 205"; that the patient was extremely ill and had been getting steadily worse for months; that the infection was completely resistant to the ordinary preparations of antimony and arsenic; that since the administration of "Bayer 205" all symptoms of the disease have disappeared, the general condition of the patient has improved enormously, his weight has increased by 18 lbs., his blood has been free from parasites and non-infective to rats for an observation period of four months—these facts, considered in the light of the usual history of cases suffering from *T. rhodesiense*, warrant the hope that in "Bayer 205" we have a drug of exceptional trypanocidal power."

A. G. B.

VON SCHUCKMANN (W.). **Ueber die Einwirkung von "205 Bayer" auf Trypanosomen ausserhalb des Tierkörpers.** [On the Action of "Bayer 205" on Trypanosomes outside the Animal Body.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 485–490. With 4 text figs.

In this paper the author describes the action of "Bayer 205" on trypanosomes *in vitro*. Inactivated guinea-pig serum (0·5 cc.) was

mixed with a trypanosome suspension in sodium citrate solution (0·2 cc.) and placed in a small tube with 0·1 cc. of a 1–10 per cent. solution of "Bayer 205"; in the control experiments the solution of "Bayer 205" was replaced by an equal volume of physiological saline. The earlier experiments were conducted at 37° C., but the later ones at room temperature. The parasites used were *T. brucei*, *T. congolense* and *T. equiperdum*. Samples were taken from the tubes at intervals varying from half to two or more hours, and examined in the fresh and stained condition.

No change was noted in the control experiments, the trypanosomes maintaining their normal appearance and activity. The most marked alteration in morphology produced by "Bayer 205" was an enormous increase in the size of the vacuole situated just anterior to the blepharoplast. (The author produces evidence to show that this vacuole is a constant and normal structure.) Other changes observed were a decrease in the motility of the trypanosomes and marked agglutination of the parasites. The author observes that WENDELSTADT and FELLMER (1906) have recorded somewhat similar changes in the trypanosomes of heavily infected rats after the administration of brilliant green.

W. Y.

WENYON (C. M.). **The Action of "Bayer 205" on *Trypanosoma equiperdum* in Experimentally Infected Mice.**—*Brit. Med. Jl.* 1921. Nov. 5. p. 746.

The author obtained a sample of the drug from Dr. C. R. HENNINGS, through the intermediary of Sir David BRUCE, and tested its therapeutic action on a very virulent strain of *T. equiperdum*, which killed mice in three or four days. In all cases, the drug was given 48 hours after inoculation, when trypanosomes were swarming in the blood. It was found that a dose of 2·5 mgm. per kilo of body weight caused the trypanosomes to disappear, but that relapse occurred in about a week. A dose of 5 mgm. per kilo was not followed by any relapse during ten weeks' observation. It was possible to give a mouse with a heavy infection as much as 500 mgm. per kilo, but sometimes the animals succumbed to its toxic effects within 24 hours; with half this dose the toxic reaction is slight.

Wenyon writes that "Bayer 205" has a remarkable action on the trypanosomes, in that in every instance (over 50 mice) a single injection of a suitable dose has apparently brought about a *therapia sterilisans magna*, and this in a dose which is considerably lower than that which can be given without killing the animals.

W. Y.

PEARCE (Louise). **Studies on the Treatment of Human Trypanosomiasis with Tryparsamide the Sodium Salt of N-Phenylglycineamide-*p*-Arsonic Acid.**—*J. Experim. Med.* Supplement No. 1. 1921. Dec. 1. Vol. 34. No. 6. 104 pp. With 7 charts in text.

This paper is the report of a mission sent by the Rockefeller Institute to the Belgian Congo in May, 1920, to study the effect of tryparsamide (the sodium salt of n-phenylglycineamide-*p*-arsonic acid) (this *Bulletin*, Vol. 15, p. 390, and Vol. 17, p. 333) on patients suffering from sleeping sickness. All the work was done at the Government laboratory and Hôpital de la Reine in Léopoldville. The 77 cases treated represented

all grades of the infection, and included previously untreated cases as well as several who had been treated with one or more drugs for varying lengths of time. Trypanosomes were found in 67 cases by gland puncture, in one case in the centrifuged blood, and in one case in the spinal fluid; in eight cases under treatment at the time of transfer trypanosomes were not found. A lumbar puncture was made before treatment in 72 cases—it was omitted in the case of an infant and in four ambulatory patients.

Tryparsamide is a white crystalline substance of stable character and is extremely soluble in water in concentrations as high as 50 per cent. [For further chemical details *vide* papers cited above.] In most cases a 20 per cent. solution was used, being injected intravenously, but varying strengths from 10 to 40 per cent. were also employed. When injected into the tissues it is quickly absorbed and produces but slight irritation; in a few patients the injections were made deeply in the muscles of the buttocks.

The paper is divided into three sections, dealing respectively with (1) the administration of single doses in early cases; (2) the administration of repeated doses in early cases, and (3) the administration of repeated doses in advanced cases.

The author gives the following discussion of her results:—

"The purpose of the work reported in this paper was the obtaining of certain fundamental facts in regard to the action of tryparsamide in human trypanosomiasis, since experimental toxicologic and therapeutic investigations with the drug had indicated its possible use in the treatment of patients suffering from this disease. The observations of 77 patients in early and advanced stages of trypanosomiasis caused by *Tr. gambiense* and treated with tryparsamide formed the basis for this study. The patients came from various parts of the Belgian Congo, and most of them had not received previous treatment.

"It was realized that objective information on the action of single doses must precede the use of several doses and, further, that the effect of a few doses be studied before one could devise a logical system of repeated dose therapy. Consequently, the work was conducted along the general lines suggested by these principles. The first observations were concerned with determining the trypanocidal action of various sized doses of tryparsamide by microscopic examinations of centrifuged blood and lymph gland juice, and included both the time of occurrence of this action and its duration in relation to the time of treatment. From a series of some 90 examinations after the treatment of patients in all stages of the disease with doses ranging from 0·3 to 7·0 gm., or 4·7 to 112 mg. per kilo of body weight, administered intravenously in most instances, it was found that tryparsamide was an active trypanocidal agent, since its administration was consistently followed by negative examinations for trypanosomes in the superficial lymph glands and blood within 24 hours. The smaller doses up to 50 mg. per kilo of body weight produced negative lymph gland and blood examinations within 15 hours in the majority of cases, and this number was increased after larger doses of 54 to 112 mg. per kilo. In certain patients, no trypanosomes were found in the blood as early as 3½ hours after treatment but, in general, doses of 2·0, 3·0 and 4·0 gm. produced a peripheral sterilization in from 6 to 12 hours.

"The duration of peripheral sterilization induced by single doses of tryparsamide was next studied in patients in the first period of the disease, or as indicated by a slight increase in the number of cells of the cerebrospinal fluid, in the beginning of the advanced period. Without taking into account differences in the severity or type of the infections in individual patients, it was found that the duration of peripheral sterilization varied from 17 to 58 days in the 12 patients who had been given single doses of 0·5 to 5·0 gm., or from 17 to 83 mg. per kilo of body weight.

On the other hand, no peripheral relapse was detected during observation periods of from 40 to 111 days in the 9 patients who had been treated with single doses of 0·5 to 3·0 gm., or from 9 to 68 mg. per kilo. It appears, therefore, that within the limits of dosage of from 0·5 to 5·0 gm., peripheral sterilization in relapsed patients endures on an average of from 3 to 6 weeks; but since there was one relapse 17 days after treatment, it seemed advisable in planning a system of repeated doses to begin with intervals of 1 and 2 weeks until the results of larger series of single dose administrations should be available for consideration.

"The effects of intramuscular administration upon the duration of peripheral sterilization are significant. Four patients were treated by this route with single doses of from 37 to 57 mg. per kilo; the immediate effect upon the trypanosomes in lymph glands and blood was similar to that observed after the intravenous route, but on the whole the duration of this action was definitely more prolonged, as seen by the average time of relapse, 7 weeks after treatment. In 3 patients there was practically no local reaction, while the tenderness and induration which occurred in one instance was probably due to a passing mild infection. While no subcutaneous injections were given, a slight amount of drug solution escaped into the tissues surrounding the vein in a few instances, but no irritation or discomfort of any sort arose, and in a few hours complete absorption had taken place.

"The spinal fluid of early cases treated with single doses of tryparsamide was examined, because of the possibility that the disease might progress and involve the central nervous system during the period of blood and lymph gland sterilization. A lumbar puncture was made on an average of 5 weeks after treatment in 14 patients with initial normal or slightly abnormal spinal fluids who had been given single doses ranging from 0·5 to 3·0 gm. or 9·0 to 68·0 mg. per kilo. In every instance except one the second cell count continued to be normal, or was decreased to within or toward normal limits; in one patient the result was uncertain because of blood contamination of the first specimen of spinal fluid. No trypanosomes, however, could be found in the lymph gland juice, centrifuged blood, or centrifuged spinal fluid of this patient.

"The general physical reaction of patients in the first period of the disease treated with single doses was prompt and satisfactory. In two or three days after treatment the subjective symptoms disappeared and the pulse rate and temperature became normal; within a month the blood count was materially improved, the patient had gained weight, and the cervical lymph glands were small and indurated. Interruptions of this favourable course of events occurred in those patients who harboured other infections, or who ultimately had a trypanosomal relapse, but in general a definite and usually a marked beneficial effect was observed. In addition, no untoward reactions of any kind were observed in these patients, either of an immediate occurrence or of a more delayed appearance.

"The use of repeated doses of tryparsamide was based upon the action of single doses, and a number of previously untreated patients, as well as those who had suffered a relapse after single doses, were given from 4 to 7 doses of 2·0 to 5·0 gm. at weekly or fortnightly intervals. Only the initial observations are at present available. The preliminary effect as regards negative trypanosome examinations of lymph glands and blood and general clinical improvement indicated by the disappearance of subjective symptoms, pulse and temperature curves, blood counts, gain in strength, and increase in weight occurred in both groups of patients. Microscopic examinations of lymph gland juice and centrifuged blood made from time to time during the course of treatment were uniformly negative.

"Obviously no predictions of the ultimate therapeutic results in these patients can be made, and while it is not unlikely that future experience may show that a more prolonged system of therapy is necessary, it seemed

advisable in the beginning to determine the effect of a relatively small number of doses.

"The treatment of advanced cases of trypanosomiasis must take into account not only the invasion of the cerebrospinal axis by the infecting organism and the resultant injuries, but also the chronicity of the disease, its tendency toward exacerbation and the debilitated physical state of many patients. With these facts in view, some system of repeated dose therapy appears obligatory, and the treatment with tryparsamide, therefore, based upon the action of single doses, consisted in the administration of several doses ranging from 1·0 to 7·0 gm. at intervals of from 3 to 14 days. Twenty-eight patients, who presented a wide variety of nervous and mental symptoms, and whose spinal fluid showed an increased cell content of from 15 to 572 lymphocytes per cmm., together with large mononuclears and mulberry cells in most instances, were under observation for a sufficient length of time after treatment to permit of subsequent lumbar punctures as well as other clinical examination. The cell content of the spinal fluid was used as a criterion of the degree of cerebrospinal involvement, as well as a therapeutic guide, and also as an index of the effect of treatment.

"The immediate sterilizing action of tryparsamide was noted in those patients whose lymph gland examination was positive on admittance; trypanosomes were not found in seven patients who were being treated with atoxyl and tartar emetic at the time of transfer to tryparsamide therapy. Repeated microscopic examinations of lymph gland juice and centrifuged blood made during the period of observation were negative in all patients. In general, the physical status of the patients was materially benefited, as was shown by the return of the pulse and temperature to normal limits, the prompt disappearance of the subjective symptoms, and by improved blood counts and gains in weight. The improvement in habits and personal appearance of several patients was also noticeable. The early termination of treatment in three patients was followed by a clinical exacerbation of the disease and ensuing death; in one of the three there was a complicating acute amoebic dysentery. The nervous and mental symptoms which were present in many instances were greatly improved or completely eliminated, except in two very advanced patients with marked mental deterioration, who had been treated with other drugs for long periods of time, and in whom the change was slight.

"The effect of tryparsamide upon advanced trypanosomiasis, as illustrated by this group of patients, is further evidenced by the marked and rapid diminution of the cells of the spinal fluid. In general, three or four weekly doses of 3·0, 4·0, or 5·0 gm. produced decreases of from 57 to 98 per cent. in an average of five weeks. In five patients, whose treatment was limited to one such course, the cell content continued to decrease in four instances, as shown by a practically normal third examination made 9 to 12 weeks after admittance, while in one patient there was no further decrease. Sixteen patients who were given second courses of treatment showed a continued decrease of cells; three showed practically no change from the count made after the first course of treatment; in one there was a slight increase in cells, and in another, after three irregularly spaced doses, the cells had returned to practically the original count. In this limited number of cases it was apparently more difficult to accomplish a further decrease of the spinal fluid cell content by a second course of treatment than it was to produce the initial and marked diminution by the first course, but at any rate, in these five instances, the active progression of the disease was apparently arrested. Considering the pathological conditions of cerebrospinal trypanosomiasis, it seems not unlikely that a longer first course of treatment than that employed in most of these patients would give more satisfactory results. Regarding the effect produced by more frequent smaller doses, as contrasted with larger doses separated by longer intervals of time, it appears that the use of

semiweekly doses of 2·0 gm., for instance, had apparently no advantage over a weekly dose of 3·0 or 4·0 gm.

"Finally, we wish to consider the only untoward effect encountered during the course of this work. Dimness of vision of various degrees occurred in nine advanced cases, five of whom had received previous arsenical treatment. It should be pointed out that there was no instance of visual disturbance of any kind in the early cases or in the first stages of the cerebrospinal period of the disease, or after any single dose of tryparsamide. The largest dose given in our cases was 7·0 gm. In the majority of instances this effect was entirely transitory and in the others various degrees of improvement took place. Three patients, who were given too frequent an administration of medium sized doses, showed considerable degrees of impairment, and of these two recovered completely; of three other patients with about the same degree of impairment one showed slight improvement, another moderate improvement, and the third complete recovery, while in the remaining three a less marked visual disability was transitory. It would seem from a study of these cases that too frequent administration of medium and large doses to patients suffering from very advanced trypanosomiasis is one factor that contributed to this condition. It is significant to note in this connection that resumption of treatment with smaller or more widely spaced doses was not followed by a return of the condition or by an intensification of residual symptoms. In addition, the time of occurrence of this untoward effect, two to seven days after treatment, together with the nature of the pathological injury to the optic structures in cerebrospinal trypanosomiasis, and the fact that improvement of some degree always occurred, suggests that the cause of the visual impairment is related to the processes of resolution and healing of the lesion already present rather than to a direct toxic action upon the nerve itself. The ophthalmoscopic examination of several patients who had partially or completely recovered from this condition also lends support to this view. The experimental work with tryparsamide showed that apparently the drug possesses the power of tissue-penetrability to a marked degree, since a characteristic feature of the treatment of rabbit trypanosomiasis was the rapidity and completeness with which extensive cutaneous and subcutaneous lesions regressed and healed. Individual variations in the extent or degree of lesions is the probable explanation of the fact that several patients with as markedly altered spinal fluids, and as pronounced nervous and mental symptoms developed no visual disturbances whatever after similar treatment.

"From the facts at our disposal, it would appear that the occasional occurrence of visual disturbances, which may perhaps be avoided by a slightly different system of dose repetition, does not at present constitute an objection to the use of the drug. The impression which one has after treating advanced cases with tryparsamide is that a suitable interval between doses of a certain size is probably the most important factor in preventing the occurrence of untoward visual effects. Doses of 3·0 gm. or over should preferably not be given oftener than once a week, and since longer intervals between doses have been followed by clinical improvement and marked decreases in the cells of the spinal fluid, further use of a system of wider spaced repeated doses may show similar beneficial therapeutic effects without concomitant visual disturbances."

[This lengthy paper, to which it is difficult to do justice in a short summary, is well worth careful study by those interested in the subject. It contains a mass of carefully collected observations admirably set forth and is, in the reviewer's opinion, a solid contribution.]

W. Y.

MARSHALL (Claude H.) & VASSALLO (S. M.). **Further Report on the Treatment of Sleeping Sickness.** —*Brit. Med. Jl.* 1921. May 28. pp. 773–775.

MARSHALL (Claude H.). **A New Method of Treatment of Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 and May 20. Vol. 15. Nos. 1 and 2. pp. 10–20. (Discussion pp. 20–34. With 1 fig.)

——. **A Paper on a New Method of Treatment of Human Trypanosomiasis.**—*Jl. Trop. Med. & Hyg.* 1921. Oct. 15. Vol. 24. No. 20. pp. 265–267. With 1 text-fig.

EYRE (J. W. H.) & MARSHALL (C. H.). **A Case of Trypanosomiasis treated by Intrathecal Serum.**—*Brit. Med. Jl.* 1921. Aug. 20. pp. 284–286.

These papers deal with the same matter, and give later information concerning experiments on the treatment of sleeping sickness described a year ago [this *Bulletin*, Vol. 16, p. 368]. The authors state that attempts to cure patients infected with trypanosomes have, in the vast majority of cases, proved unsuccessful, although individuals—certainly European and Asiatic, possibly also African—have recovered. Most authorities are agreed that a single dose of salvarsan, neosalvarsan or atoxyl is sufficient to sterilize the blood-stream, but within a variable period the symptoms reappear. Two theories have been offered to account for this—(1) that the trypanosome assumes a resistant form and becomes "fast" to the particular drug used; (2) that some of the parasites are protected from the action of the drug owing to their secluded position in the central nervous system. The authors consider the latter is the correct explanation, and cite a number of cases which they believe support this view. In these cases the blood and gland juice were rendered free from parasites by an injection of neo-kharsivan, but punctures made three days to three and a half months afterwards showed trypanosomes in the cerebrospinal fluid.

Post-mortem examination of one or two fatal cases of sleeping sickness showed the meninges of the brain to be greatly thickened, and the authors believe that these changes prevent drugs circulating in the blood-stream reaching the spinal fluid, so that, although the parasites in the blood are killed off by the drug, the infection persists in the central nervous system and reinfects the blood-stream again. They quote Professor KEITH as stating that "There is no doubt that infections in the basal cisterns do reach the cervical glands, and that very probably this occurs through the nerve-sheaths." In the treatment of sleeping sickness two separate foci of infection must be considered. Firstly, that of the blood-stream and, secondly, that of the cerebrospinal fluid.

Acting on the above assumption, the authors at first attempted intrathecal, in addition to intravenous, medication; the result was fatal, and the experiment was not repeated. The following procedure was then adopted:—

An intravenous injection of neokharsivan was given, and three hours later blood was withdrawn from the patient into a sterile covered vessel, which was left standing in a bowl of cold water for 20 hours. The serum was then removed from the clot and 20 minims injected into the spinal canal after a corresponding amount of spinal fluid had been withdrawn.

Of 56 cases treated up to the present 21 were treated during the last six months and have not been re-examined. Of the remainder,

eight are dead, or presumed to be dead; three died of sleeping sickness, three died of intercurrent disease, and two disappeared, presumably owing to death. The other cases have been re-examined at periods varying from six months to 27 months after treatment. The blood, glands and cerebrospinal fluid were in each case negative, and all were doing well. The number of re-examinations was, however, very few. Two cases were re-examined five times, one case four times, six cases three times, and the rest only twice or once.

The authors suggest that the beneficial action of intrathecal injection of serum is due to trypanolytic antibodies present in the serum, but absent from the cerebrospinal fluid, and with a view to testing this theory they propose to repeat their experiments on other cases, omitting, however, intravenous injections of neokharsivan. One case so treated has gone on well for six months; no trypanosomes could be found in the blood or spinal fluid, and the cervical glands have disappeared.

Details are given concerning the treatment by this method of a European patient who contracted sleeping sickness in July, 1920. In September he was given an intravenous injection of 0·9 gm. of neokharsivan; blood was withdrawn half an hour later, and 12 cc. of the serum injected into the spinal canal. There was a severe reaction, lasting several days, and then uninterrupted recovery. On November 2, 1920, however, although direct blood examination was negative, one or two sub-inoculated rats became infected. On December 21, 1920, a single degenerated trypanosome was found in a blood film, but inoculation of the blood into two guinea-pigs was negative. On January 20, 1921, lumbar puncture was performed and the cerebrospinal fluid found to be negative; it was inoculated into two rats, with a negative result. Further examinations on April 7 and May 2, 1921, were likewise negative.

The authors believe that the presumed cure in this case is due to the intrathecal injection, which dealt with that focus of infection, while the continued formation of trypanolysins in the blood destroys the parasites in the blood-stream.

[It must be noted in this connexion that there is no record that the cerebrospinal fluid of this patient was infected before treatment commenced, and, consequently, we have no reason to believe that there was any focus of infection in the spinal canal.]

The authors summarize their work as follows:—

"To sum up, as far as our experiments have gone, they show (1) that there are two distinct foci of infection in an established case of sleeping sickness, and that of these the focus in the central nervous system is the important one, but that this can be dealt with effectively by a single dose of some sort of serum; (2) that the results of such serum treatment in over fifty cases appear to be better than any of the results hitherto obtained by repeated intravenous or subcutaneous injection of salvarsan, atoxyl, antimony, or other preparations; and we suggest that the curative effect results from the formation and action of some form of trypanolysin."

[Reference has already been made to these papers; see this *Bulletin*, Vol. 18, pp. 155–174.]

W. Y.

SHIRCORE (J. O.). **Trypanosomiasis: a New Method of Treatment.** [Correspondence.]—*Lancet.* 1921. Sept. 24. pp. 680–681.

In this letter the author refers to the papers of MARSHALL and VASSALLO, and points out that the method of treatment of

trypanosomiasis by intrathecal injection of serum was suggested many years ago by THIROUX and D'ANFREVILLE, and by BALFOUR (*Sleeping Sickness Bulletin*, 1909, p. 223 and p. 163).

W. Y.

SCHAMBERG (Jay Frank), KOLMER (John A.) & RAIZISS (George W.). **The Toxicity and Trypanocidal Activity of Sodium Arsphenamin.**—*Jl. Amer. Med. Assoc.* 1921. June 25. Vol. 76. No. 26. pp. 1823–1824.

The authors investigated the toxicity and trypanocidal activity of sodium arsphenamin and compared them with those of arsphenamin and neoarsphenamin [this *Bulletin*, Vol. 17, p. 332]. The experiments were carried out in rats infected with *T. equiperdum*.

The conclusions are as follows :—

"1. The highest tolerated dose of sodium arsphenamin for white rats by intravenous injection was found to be from 212 to 215 mg. per kilogram of weight. The average tolerated dose of arsphenamin was 105 mg., and of neo-arsphenamin 200 mg., per kilogram.

"2. The smallest trypanocidal doses of sodium arsphenamin varied from 16 to 24 mg., per kilogram of weight; the smallest trypanocidal dose of arsphenamin was 5 mg., and of neo-arsphenamin 9 mg. per kilogram.

"3. The therapeutic dose (dosis curativa) of sodium arsphenamin was from eight to thirteen times less than the highest tolerated dose (dosis tolerata), which expresses the therapeutic index of this compound. The therapeutic dose of arsphenamin was twenty-one times less than the tolerated dose, and the therapeutic dose of neo-arsphenamin was twenty-two times less.

"4. Therefore, while sodium arsphenamin possesses the low toxicity of neo-arsphenamin, it is much inferior to both arsphenamin and neo-arsphenamin in trypanocidal or curative activity.

"5. The true gage of a remedy is expressed by its chemotherapeutic index, *i.e.*, the relation of the curative to the toxic doses."

W. Y.

i. SAZERAC (R.) & LEVADITI (C.). **Action du bismuth sur la syphilis et sur la trypanosomiase du nagana.**—*C.R. Acad. Sci.* 1921. May 30. Vol. 172. No. 22. pp. 1391–1392.

ii. ——— & ———. **Action du bismuth sur le trypanosome du nagana.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 430–431.

i. Reference is made to the fact that SOUTAN and ROBERT have shown that bismuth exerts a prophylactic and, to a certain extent, curative action in spirochaetosis of fowls, and that they stated that they had obtained positive results in the treatment of trypanosomiasis with the same preparation.

Sazerac and Levaditi have tested the action of tartro-bismuthate of potassium and sodium on rabbits experimentally infected with spirochaetes from cases of human syphilis, and also on rabbits experimentally infected with *Sp. cuniculi*. In later experiments they employed the drug in the treatment of a guinea-pig infected with nagana.

The conclusions are that the tartro-bismuthate of potassium and sodium has a definite curative effect on experimental syphilis of the

rabbit, and also that it has some therapeutic value in the treatment of nagana. They propose to ascertain the effect of other derivatives of bismuth.

ii. It was found that guinea-pigs could tolerate a dose of potassium, or sodium, bismuth tartrate of 200 mgm. per kilo of body weight. A dose of 100 mgm. per kilo, caused trypanosomes to disappear from the blood within one to two days, but a relapse occurred in 12 to 15 days. When the dose was increased to 200 mgm. per kilo the relapse was delayed for a month.

W. Y.

JAMOT. **De l'utilisation des naturels de l'Afrique équatoriale pour la lutte contre la maladie du sommeil.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 85–92.

During the war it was necessary to employ native assistants in the combat against sleeping sickness, in French Equatorial Africa, to make good the deficiency of medical personnel. The natives, although illiterate, proved capable of acquiring rapidly the necessary manipulative skill for the microscopic diagnosis and treatment.

The author had charge in the Oubangui-Chari district at the beginning of 1917 of a dozen native and two European hospital assistants. All had received the same instruction and were interchangeable, but in order to obtain the maximum of efficiency they were each given a definite piece of work. They were grouped into three mobile groups—one for diagnosis, the other two for treatment. The diagnosis group consisted of five natives, of whom three were occupied exclusively with microscopic examination and the other two with gland puncture. Each treatment gang consisted of two men: one gang followed the diagnosis gang and worked under the direction of a doctor or European assistant; the other worked under the direction of a European assistant and was charged with administering to each patient the treatment ordered by the doctor.

Further details are given illustrating the manner in which the service functioned.

The patients received a preliminary treatment of atoxyl (1 gm. per adult, or about 1·5 cgm. per kilo of body weight); the patient was then provided with a tally, on which was inscribed the treatment given and that which should be given subsequently.

Operating in this manner, the service has been able to visit, in less than two years, all the villages in the area of 100,000 square kilometres. Of 89,743 persons examined, 5,247 were found to be infected. It was found that the patients who were not treated died in the proportion of 40 per cent. annually; in the whole section, which possessed a population of about 100,000 persons, 2,071 died from trypanosomiasis during the year which preceded the operation of the service.

As a result of treatment by atoxyl in the above-mentioned doses every month or every two or three months in an irregular manner, or by atoxyl associated with neosalvarsan, it was estimated that in the year which followed the commencement of the service 714 died, *i.e.*, a decrease in mortality of 65 per cent. Moreover, examination

of blood, by the centrifugation method, of 753 patients treated as above, two to 23 months after the last treatment, showed 598 to be negative, *i.e.*, a reduction in the mass of infective cases of about 80 per cent.

The author states that these results show that it is possible to rely very considerably on native co-operation in the campaign against trypanosomiasis.

At the end of Jamot's paper Inspector-General GOUZIEN gave a résumé of the present position of the campaign against sleeping sickness in French Equatorial Africa. On the invitation of the Governor-General of French Equatorial Africa, a commission was established in December, 1917, under the presidency of GOUZIEN, and comprising among its members WURTZ, MESNIL and ROUBAUD. The recommendations of this commission were transmitted to the various colonies in the form of instructions. They concern themselves with measures devised with the object of diminishing the trypanosome reservoir by periodic atoxylization of infective natives, measures directed towards the definite cures of the infected, the establishment of sanitary barriers to prevent the passage of infected from one zone to another, the clearing of the bush and undergrowth, and the displacement of certain villages [see this *Bulletin*, Vol. 16, pp. 362–3].

W. Y.

LEPINE. **La prophylaxie de la maladie du sommeil au Cameroun.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 172–178.

Investigations during the years 1916 to 1919 have shown that there exists only a single important focus of sleeping sickness, in the Haut-Nyong region. From January to March, 1920, a mission was sent to examine all the country between Akonolinga and Doumé. Of the 3,042 persons examined, 123 were found to be infected with trypanosomes, 11 others exhibited well-marked clinical signs of the disease, and 48 were regarded as suspects.

Machinery was then devised to combat the infection, and the organization consisted of three parts, the first dealing with prophylaxis, the second with instruction, and the third with the isolation of the infected in a camp.

The prophylaxis section consists of three subdivisions, viz., that of Akonolinga, that of Doumé, and that of Abong Bang. The operations of the section are described; each recognized case receives immediately an injection of atoxyl, which is renewed as frequently as possible, in order to obtain not only sterilization of the blood, but eventually cure.

Up to December 31, 1920, 11,419 natives had been examined, and 2,503 were found to be infected.

The centre of instruction, which was established provisionally at Akonolinga, was subsequently removed to Ajos, where the sleeping sickness camp also was established, and here the doctors and hospital attendants were able to familiarize themselves with the different clinical types of the disease and to learn to search for trypanosomes.

The isolation hospital was established at Ajos on October 1, 1920, and up to December 31, 1920, 96 cases had been admitted; of these 8 have died, 2 have run away, and 10 have been discharged greatly improved, if not cured.

W. Y.

CLAPIER (P.), **Contribution à l'étude des résultats thérapeutiques fournis par l'atoxylisation prophylactique dans la trypanosomiase humaine.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 238–247.

From December, 1913, to July, 1914, OUZILLEAU discovered and treated a great number of cases of sleeping sickness in the districts Ibenga Motaba (Middle Oubangui) which comprise Sector II. in the French Congo. Acting under the instructions of OUZILLEAU, the author conducted an inquiry, during the period July, 1920, to January, 1921, into the fate of these natives.

In the records the patients were divided into "suspects," "clinically infected," and "certainly infected." Of 1,078 natives recognized in 1914 as "certainly infected" by discovery of the trypanosome, 538 (49·9 per cent.) had died during the six and a half years, 167 (15·5 per cent.) had disappeared, and 373 (34·6 per cent.) were living and were re-examined. From December, 1913, to the end of July, 1914, these patients had received one, two, or three injections of atoxyl in doses of 1 gm. for an adult and 1·5 to 2 cgm. per kilo for a child. During the re-examination of the region 52 of the old infected cases were found to harbour trypanosomes, but whether this was due to relapse or reinfection it is impossible to say; the author inclines to the view that they were reinfected. In 44 of the cases trypanosomes were found by direct examination of gland juice, and in eight other cases by the blood centrifugation method. The latter method was undertaken whenever time permitted, and in all 115 cases were so examined, with 6·9 per cent. of positive results. The author points out that if this method had been adopted in all cases showing no glandular signs, one might have expected to find altogether 70 cases infected,—that is, 18·7 per cent. of the old cases which were found again and re-examined. Thus six years after atoxylization a third of the cases treated were re-examined, and of these about 80 per cent. were free from infection; almost all of them were leading a normal life in their ordinary conditions.

In the second part of his paper the author gives the results of periodic atoxylization of patients from the same sector, commencing in February, 1919. A total of 3,147 infected persons was treated and received in all 10,133 injections. During a mean observation period of 17 to 18 months, 509 (16 per cent.) died. They received one to nine injections each. Details are given in a table, where it is shown that 81 per cent. of those who died did so after the first or second injection, during the six or eight months which followed diagnosis. After this period the mortality became very slight. The heavy mortality in the early months was due to the fact that on the occasion of the first visit to a district a number of very advanced cases were seen.

Those cases which have survived have received injections pretty regularly, at least one every six months, but this has usually been largely exceeded, the average number of injections received by each patient per half-year varying from 1·9 to 6·1 according to the district in which he lived. The dose was 1 gm. for an adult and 1·5 to 2 cgm. per kilo for a child. An attempt has been made during the visits to the various districts to double the injections, *i.e.*, to give injections to each patient at intervals varying from one to three weeks.

W. Y.

BATTAGLIA (Mario). **Histologische Veränderungen in den Organen an experimenteller Trypanosomiasis verendeter Tiere.** [Histological Changes in the Organs of Animals which have succumbed to Experimental Trypanosomiasis.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Vol. 86. No. 5. pp. 393–395.

The author gives the following brief summary of results previously obtained by him on this subject :—

T. vespertilionis is always pathogenic in rabbits, but does not produce keratitis.

T. lewisi is not always pathogenic, but it produces keratitis or ulcerating granuloma of the sexual organs.

T. brucei is always pathogenic in rabbits, and frequently produces a progressive keratitis which involves the whole of the ocular integuments and gives rise to an ulcerating hard cartilaginous granuloma of the sexual organs.

T. dromedarii is always pathogenic in rabbits, and frequently produces keratitis which tends to resorption and is not progressive, and causes an ulcerating granuloma of the sexual organs, which, however, is not so hard or so cartilaginous as that due to *T. brucei.*

T. gambiense is always pathogenic to rabbits, but seldom produces keratitis ; when inoculated into the genital organs, it gives rise to oedema, but no granuloma.

The macroscopic and microscopic histological changes found in the various organs of animals which have died from the different infections are almost the same. The chief of these are : hepatitis, which has been described in an earlier paper* ; splenitis, changes in the subendocardial and subepicardial tissue, kidneys, salivary glands, pancreas and testes ; and hyperaemia of the entire alimentary canal and of the interlobular and subpleural connective tissue.

The dura and pia of the brain and spinal cord are very hyperaemic and infiltrated with lymphoid cells. All the vessels, especially the arterioles, showed a thickened intima. The nucleus of the nerve cells shows chromatolysis and the Nissl's granules stain feebly. No change is to be seen in the myelin threads nor in the axis cylinders ; the perineurium and endoneurium of the peripheral nerves are thickened and infiltrated with lymphoid elements.

W. Y.

DI DONIZIO (Giovanni). **Su due Tripanosomi del Bestiame nella Somalia Italiana.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 423–432. With 2 text figs. [French Summary p. 433.]

The author states that in Italian Somaliland he found two trypanosomes in domestic stock : the first was of the type *dimorphon-congolense* and was very pathogenic to cattle, the second was of the type *brucei-pecaudi* and infected Equidae. [The paper is illustrated by microphotographs of the two parasites which confirm the author's diagnosis, the first parasite being apparently *T. congolense* and the second *T. brucei.*] The author remarks that the parasites described by MARTOGLIO under the names *T. somalilense* and *T. cellii* are really mixed infections of the first-named trypanosomes, possibly with the addition of *T. cazalboui.*

W. Y.

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* *Cent. f. Bakt.* 1 Abt. Orig. 1908. Vol. 46. No. 4.

SERGENT (Edm.) & DONATIEN (A.). **De l'infection latente dans la trypanosomiase des dromadaires (le debab). (XXIIe note.)**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. July. Vol. 1. No. 2. pp. 179–184.

Debab in the dromedary is characterized by a slowly progressive cachexia often fatal, and in females by the constant symptom of abortion. During the course of the infection febrile disturbances occur, and these are always accompanied by the appearance of trypanosomes in the blood; conversely, if trypanosomes are seen in the blood one can be certain that the temperature is raised. The normal temperature of adult dromedaries is 37° C.; during the febrile paroxysms it is raised two or three degrees. The number of trypanosomes in the blood varies from one to a preparation up to a number so great that it exceeds that of the red cells. Careful study of the disease reveals two phases—the one acute, sometimes terminating in death, and the other chronic, with occasional exacerbations ending in death from cachexia or recovery.

The latent periods between the febrile attacks may be very long; in one instance it was about three and a half months. The best means of making a diagnosis during a latent period is the subinoculation of a large quantity of blood into a susceptible animal, *e.g.*, dogs. Details of the course of the disease in five naturally infected and in four experimentally infected animals are given in tabular form.

W. Y.

i. SERGENT (Edm. & Et.) & FOLEY (H.). **Essais de traitement du debab, trypanosomiase des dromadaires. I. Afridol. II. Trypanobleu. III. Émétique et Atoxyl.**—*Ann. Inst. Pasteur.* 1921. Mar. Vol. 35. No. 3. pp. 204–206.

ii. SERGENT (Edm. & Et.), DONATIEN (A.) & LHÉRITIER (A.). **Essais de traitement du debab, trypanosomiase des dromadaires. IV. Etude de l'action de l'émétique.**—*Ibid.* pp. 207–211.

i. Two camels experimentally infected with debab were treated with afridol; the drug was given subcutaneously. The first animal had 15 gm. during four months, five injections of 2 to 4 gm. each being given. The trypanosomes did not disappear for a long time after injection, but the condition of the animal rapidly improved, and ultimately the blood became negative. The second animal received approximately the same dosage, but without any effect, death finally occurring, and at the time parasites were present in the blood.

Two dromedaries naturally infected, and one experimentally infected, were treated with trypanblue, but without success.

Two experimentally infected dromedaries were treated with tartar emetic and atoxyl. An intravenous injection of 2 gm. of the former and a subcutaneous injection of 3 gm. of the latter were given each week for a period of three weeks; both animals were cured.

ii. In further experiments with tartar emetic on dromedaries infected with debab the authors examined first the action of a single intravenous injection, and found that the dose which should be given is 1 gm., which causes trypanosomes to disappear from the blood and the temperature to fall for eight days. As usually parasites reappeared after eight days, it was found necessary to give a series of injections, and finally a series of four injections was given at intervals of a week.

Each time trypanosomes reappeared a further series of four injections was given.

Of six dromedaries treated in this manner, four were cured; two were poisoned by the drug (one dying and the other still showing trypanosomes). It was found that those dromedaries did best which had received the smallest amount of the drug, as when the organism is poisoned the parasiticidal action of the drug was lost. The four animals which were cured received between 17 and 28 gm. of tartar emetic in nine to ten months; the two in which treatment was unsuccessful were given 38–39 gm. in twelve months.

The general conclusion is that tartar emetic is of great value in the treatment of debab.

W. Y.

BRODEN (A.) & VAN GOIDSENHOVEN (Ch.). **Le diagnostic de la dourine.**—*C.R. Soc. Biol.* 1921. May 7. Vol. 84. No. 16. pp. 839–840.

The blood centrifugation method is recommended as a means of finding *T. equiperdum* in the blood of dourine horses. The technique adopted by the authors is as follows :—

A volume of blood equal to about 50 cc. or so, depending on the size of the centrifuge, is divided into two portions and centrifuged at about 1,000 to 1,400 per minute, until the red cells are fairly well separated from the plasma; the latter, which contains a few red cells, is then removed and centrifuged again at 1,400 to 1,500 per minute for eight to ten minutes, by which means the remaining red cells are completely deposited; the plasma is again removed and centrifuged a third time at 3,000 to 3,500 per minute for eight to ten minutes. The deposit from this final centrifugation consists of platelets, a few leucocytes and trypanosomes, if these are present.

This procedure, which was adopted by Broden in the diagnosis of human trypanosomiasis [this *Bulletin*, Vol. 17, p. 326], gave a positive result in the horse examined.

W. Y.

BESSEMANS (A.). **La réaction de Bordet-Gengou dans le diagnostic de la dourine.**—*C.R. Soc. Biol.* 1921. July 2. Vol. 85. No. 24. pp. 256–258.

The author refers in some detail to previous papers dealing with this subject. In his experiments he has examined 81 sera from normal horses, and horses suspected to have, or definitely affected with, dourine. As antigen he used a glycerine extract of trypanosomes obtained by centrifugation of the blood of heavily infected rats and guinea-pigs. Details of the technique are given. It was found that the serum of untreated horses showing clinical symptoms of the disease gave a positive result in all of seven cases, and the serum of horses which showed no clinical signs of the disease gave a negative reaction in all of 20 cases. Of 17 animals showing clinical signs and treated by atoxyl only three, which had been subjected to a prolonged and intense treatment, gave negative results. With regard to animals suspected (either from their lesions or from their history) to have the disease, of 37 cases 19 gave a negative reaction, 11 a feebly positive reaction, and 7 a definitely positive reaction.

The author remarks that the three antigens (surra, nagana and dourine) used by him gave the same results. On the other hand, antigens prepared from spirochaetes and from organ extracts gave entirely negative results.

The conclusion is that the reaction is specific for the genus *Trypanosoma* and is of value in the diagnosis of dourine in horses.

W. Y.

BESSEMANS (A.). **Effet du chauffage sur les sérums de cheval dans la réaction de Bordet-Gengou pour de diagnostic de la dourine.**—*C.R. Soc. Biol.* 1921. Nov. 12. Vol. 85. No. 32. pp. 889–892. With 2 text figs.

There is a difference of opinion on the value of the complement deviation test for dourine. Bessemans, however, points out that the different investigators have not all inactivated their sera in the same manner, the temperature used varying from 50° to 60° C., and the duration from 15 to 30 minutes.

As a result of his work, the author concludes :—

1. The serum of a normal horse contains, in variable quantity, substances capable of producing with dourine antigen a non-specific deviation of complement. After heating at 56° to 58° C. for 30 minutes, the quantity of this substance is considerably reduced ; heating to 60° C. for 20 minutes causes it practically to disappear.

2. In applying the complement deviation test, it is then essential to inactivate the serum by heating at 60° C. for at least 30 minutes.

3. Theoretically, it may be expected that certain sera of slightly affected animals may not give the test ; in practice it is found that this is the case only with sera from animals recently infected or intensely treated.

W. Y.

LANFRANCHI (Alessandro) & SANI (Luigi). **L'intrapalpebro-reazione nella diagnosi del Morbo Coitale Maligno.** [The Intrapalpebral Reaction in the Diagnosis of Dourine.]—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 374–377. With 1 plate. [French Summary p. 378.]

The authors used as antigen *T. brucei*, and the virus of Lanfranchi obtained free from the elements of the blood by means of a haemolytic serum, emulsified in glycerine (1 to 3), or in glycerine diluted with normal saline or distilled water. In infected animals the reactions were almost like those obtained in positive mallein reactions. The palpebral oedema appears in three to four hours and reaches its maximum in 12 to 18 hours, and then disappears slowly, being visible up to the thirty-sixth hour. The reaction is accompanied by slight fever and photophobia and lachrymation. In treated animals the oedema is more rapid, attains its maximum in 10 or 11 hours, and disappears in 20 to 24 hours ; the febrile disturbance is also less marked. In healthy animals the local reaction is almost comparable with that seen in treated animals, but the fever is generally absent. It will, without doubt, be possible, by utilizing *T. equiperdum* itself as antigen, to obtain results of practical importance.

W. Y.

NATTAN-LARRIER (L.). **Pénétration du trypanosome de la dourine à travers les muqueuses et les téguments.**—*C.R. Soc. Biol.* 1921. May 7. Vol. 84. No. 16. pp. 824–826.

The author inquires whether *T. equiperdum*, which can traverse the vaginal mucosa even more easily than *Schizotrypanum cruzi*, is able to penetrate the skin, the conjunctival mucosa, or the rectal mucosa? As a result of experiments on mice he found that *T. equiperdum* penetrated the conjunctiva in one of five cases, the rectal mucosa in one of three cases, and the depilated skin in both of two cases.

W. Y.

NATTAN-LARRIER (L.). **Essais de transmission héréditaire de la dourine.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 273–277.

The experiments described in this paper were conducted with MESNIL's strain of *T. equiperdum*, which kills mice in four to five days and rats in five to eight days.

Pregnant rats and mice were inoculated with trypanosomes, and their young, which were generally born dead, examined for trypanosomes, both directly and by inoculation of their blood and organ pulp into healthy animals. In four cases the young lived for sufficient time for the infection to have developed. The result was that no evidence was obtained that *T. equiperdum* passed from the mother to the foetus.

Further experiments showed that the young born of infected females possessed no immunity to the infection.

W. Y.

NATTAN-LARRIER (L.). **Infections par *Trypanosoma equiperdum* chez la souris et chez le rat.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 433–442.

In order to study the pathogenicity of *T. equiperdum*, the author used a strain obtained from MESNIL in 1912. As a result of his experiments he found that the pathogenicity of the parasite, at first slight, was rapidly and regularly exalted by passage through mice, until the infection became very virulent. As the virulence increased in mice, so it also increased in rats and even in guinea-pigs. The infection produced in mice oedema of the cephalic region and in the rat plaques were seen analogous to those described by ROUGET in dourine-infected dogs.

W. Y.

CHATTON (Edouard) & COURRIER (Robert). **Sur un trypanosome de la chauve-souris, *Vesperugo pipistrellus*, à formes crithidiennes intratissulaires et cystigènes. Hypothèse relative à l'étiologie du goître endémique.**—*C.R. Acad. Sci.* 1921. May 17. Vol. 172. No. 20. pp. 1254–1257.

—— & ——. **Un *Schizotrypanum* chez les chauves-souris (*Vesperugo pipistrellus*) en Basse-Alsace. Schizotrypanose et goître endémique.**—*C.R. Soc. Biol.* 1921. May 21. Vol. 84. No. 18. pp. 943–946. With 3 text figs.

In Lower-Alsace a parasite belonging to the genus *Schizotrypanum* was found in 10 per cent. of bats, *Vesperugo pipistrellus*. In the

circulating blood, the parasite resembles *T. lewisi*, but is smaller, being 15-20μ long and 10-20μ broad [*sic*]. The blepharoplast is spherical or ellipsoidal, and situated close to the posterior extremity, which is pointed; the nucleus is at the junction of the anterior and middle thirds of the body. The body is rather rigid, the undulating membrane being only slightly folded, and the free portion of the flagellum is equal to about half the length of the body. Division in the peripheral blood was never seen. Multiplication takes place in the organs, *e.g.*, in the mucosa and sub-mucosa of the stomach and intestine, the gall bladder, kidney, urinary bladder, spleen, ovary, uterus, epididymis and peritoneum. Liver, lungs, muscles, nervous system and skin are apparently free. The parasite is not found to assume a leishmania form as in *Schizotrypanum cruzi*, but assumes a crithidial form, the undulating membrane and flagellum being reduced, but functioning. The blepharoplast is situated in front of the nucleus and is elongate. The parasites are massed together in cysts with a thin fibrous capsule. In the larger cysts the crithidias become transformed into trypanosomes and the walls of the cysts containing trypanosomes are thinner than those of cysts containing crithidia, so that the trypanosomes can escape into the circulation. Cultures were made on Novy-Neal-Nicolle medium and are remarkable for the predominance of the parasites of the trypanosome form, differing little from that found in the blood. Of the 35 bats examined, only three showed trypanosomes on direct examination of the blood, and these also gave positive cultures. All the bats were bled and their organs examined, and only the three in which trypanosomes were found in the blood presented the visceral cysts containing crithidia and trypanosomes.

The authors propose to give this parasite the name *Schizotrypanum pipistrelli*.

W. Y.

SERGENT (Étienne). **Trypanosome isolé du sang d'un** *Macacus sinicus*. —*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. p. 57. With 1 text fig.

Cultures on NNN of the blood of a *Macacus sinicus* revealed the presence of a trypanosome which direct examination of the blood failed to show. The body is long and narrow and only slightly undulating; the cytoplasm is granular both anterior and posterior to the nucleus, which lies at the centre of the body; the blepharoplast is small and relatively far from the posterior extremity; the undulating membrane is narrow and the free flagellum is short. The total length of the parasite varies from 18 to 32·5μ; other measurements are given.

W. Y.

STEFFAN (Paul). **Beobachtungen ueber den Verlauf der künstlichen Infektion der Ratte mit** *Trypanosoma lewisi*. [The Course of the Artificial Infection of Rats with *T. lewisi*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. pp. 241–247. With 1 chart in text.

The conclusions are as follows :—

1. Artificial infection of rats with *T. lewisi* exhibits an acute and a chronic form. The acute form ends either in the death of the host or in the disappearance of the parasites from the peripheral blood, or changes into the chronic form.

2. On the occurrence of this change the intensity of infection of the peripheral blood falls steeply, whilst during the chronic stage it falls in a gentle curve, so that gradually the parasites disappear completely from the blood; relapses do not occur.

3. In the acute stages multiple division is the normal occurrence; instances of unequal longitudinal division are seen at the same time, whilst equal longitudinal division occurs quite rarely.

4. In the chronic stages multiplication does not take place, and divisional forms are not seen.

W. Y.

WARREN (Shields). *Trypanosoma lewisi* **in Boston Rats.**—*Jl. Med. Res.* 1921. June–Sept. Vol. 42. No. 4. (Whole No. 184). pp. 419–437. With 2 text figs.

The following summary is given :—

"1. Of 2,009 rats from the city of Boston examined in the first four months of 1921, 341, or 17 per cent., were infected with *Trypanosoma lewisi*.

"2. Examination was made by means of stained smears.

"3. No other blood parasites than *T. lewisi* were found.

"4. The infection is probably least at the season of the year during which the work was done.

"5. The infection in Boston is apparently localized in the market district, with outlying foci along the water-front; but this is probably due merely to the migration of infected rats in toward the market.

"6. Only a very small percentage of infected rats showed division forms in their blood, due probably to unfavourable climatic conditions for transmission.

"7. No infected rats showed definite lesions, but nearly all showed blood changes.

"8. A map, showing the geographic distribution of *T. lewisi*, is given, and a summary of the data on which it is based."

W. Y.

DELANOË (P.). **Au sujet de** *Trypanosoma talpae*, **Nabarro.**—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 453–455. With 1 text fig.

A description is given of *T. talpae*, which the author found in the blood of a mole at Chalons-sur-Marne. The parasite is actively motile, its length is about 35μ, it has a free flagellum, the free portion of which measures 4 to 6μ, and its breadth is about 6μ.

W. Y.

HEGNER (R. W.). **Measurements of** *Trypanosoma diemyctyli* **from Different Hosts and their Relation to Specific Identification, Heredity and Environment.**—*Jl. Parasit.* 1921. Mar. Vol. 7. No. 3. pp. 105–113. With 2 text figs.

The following summary is given :—

"1. Every one of 78 aquatic specimens and two of seven land specimens of the newt, *Diemyctylus viridescens*, collected in Pennsylvania were found to be infected with *Trypanosoma diemyctyli*, Tobey. No trypanosomes were found in 72 specimens of five other species of salamanders. Inoculation experiments with *T. diemyctyli* on six species of salamanders and two species of frogs were unsuccessful.

"2. Measurements were made of trypanosomes from 10 newts. These groups of trypanosomes differed from one another in their range of variation in total length exclusive of the flagellum, in the length of portions, and in the width of the body, in the average length of the entire body exclusive of the flagellum, in the average length of portions, and in the average width.

"3. Length and width show a positive correlation, and on an average the longer the specimen the wider it is.

"4. Of 106 trypanosomes from one newt, 100 were uniformly small, and the remaining six were much larger, indicating two different types in a single host.

"5. The different types of trypanosomes obtained from the different newts are probably races of one species that are heritably diverse in size. They may, however, belong to different species, or may be sexual phases of a single species, or may differ because of changes due to the environment."

W. Y.

ZEISS (Heinz). **Die Einwirkung menschlichen Serum von Hodgkinscher Krankheit auf** *Trypanosoma brucei* **und** *rhodesiense*. [The Action of Human Serum in Hodgkin's Disease on *T. brucei* and *T. rhodesiense*.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 7. pp. 211–215.

The conclusions are :—

Human serum from two cases of true Hodgkin's disease acted on *T. brucei* exactly as normal human serum; that is, when given in doses of 0·3, 0·5 and 1 cc. at the same time as the virus, it prevents infection. *T. rhodesiense* was not influenced in the same unequivocal manner, since the infection was not always prevented, even by a dose of 1 cc. of the serum. When the serum was administered at the height of the infection, the parasites were caused to disappear only in the case of *T. equinum*.

W. Y.

ZEISS (Heinz). **Die Einwirkung ikterischen Menschenserums auf tier- und menschenpathogene Trypanosomen.** [The Action of Icteric Human Serum on Trypanosomes of Man and Animals.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 10. pp. 302–309.

The conclusions are :—

1. Icteric human serum has no trypanocidal action on *T. brucei*, *T. equinum*, *T. equiperdum*, *T. rhodesiense*, *T. gambiense* and *Schiz. cruzi*.

2. Contact with icteric serum *in vitro* for one to three hours at 37° C. had no detrimental effect on the infectivity of the parasites.

3. Icteric serum can be activated by normal serum, that is, the trypanocidal bodies can either be stirred up or added to it. This fact suggests that in severe icteric conditions normal serum might be employed therapeutically in order to invigorate the deranged liver function which manifests itself in absence of trypanocidal power.

4. A photodynamic action of icteric serum has not yet been established.

W. Y.

ROSENTHAL (F.) & KRUEGER (M.). **Die Klinische Bedeutung der trypanoziden Serumsubstanz für die Serodiagnose der Leberinsuffizienz. I. Mitteilung.** [The Clinical Significance of the Trypanocidal Serum Substance for the Serum Diagnosis of Liver Insufficiency.]—*Berlin. Klin. Woch.* 1921. Apr. 18. Vol. 58. No. 16. pp. 382–386.

There exists in the serum of man and the anthropoid apes a specific antitrypanocidal substance. This body is much decreased in amount, not only in cases exhibiting marked lesions of the liver without icterus,

but also in cases of mechanical jaundice. In the work recorded in this paper the authors have endeavoured first to determine the constancy of this phenomenon, and second, to investigate its cause. They asked themselves whether the disappearance of the trypanocidal substance in icteric conditions was the result of a destructive process owing to the entry of bile into the blood, or whether it was bound up with specific disturbance of the liver function.

In their experiments, the authors used a strain of nagana which killed mice regularly in three to four days; the animals were inoculated intraperitoneally with a dilute suspension of trypanosomes and subcutaneously with the serum to be examined. As the result of preliminary observations, it was found that a prophylactic dose of 0·1 cc. of serum per 20 gm. mouse never failed to exert a definite trypanocidal effect. Whilst, even in grave diseases, no definite lessening of this effect was observed, it was greatly diminished in patients suffering from mechanical jaundice or severe diffuse liver diseases. As the result of a considerable number of experiments, details of some of which are given, the authors conclude that the disappearance of the trypanocidal substance from the serum is, in the absence of icterus, not a sensitive criterion of fine changes in the liver substance, but only a serological symptom of severe functional disturbances of the completely diseased organ.

Experiments were then undertaken to ascertain whether the addition of human bile to the serum inhibited its prophylactic action; this was found to be the case where the serum was mixed with bile in the proportion of 3–1. Later experiments showed, however, that when bile was added to the serum in the proportion of the bilirubin concentration of icteric serum, the trypanocidal action was in general not destroyed. The general conclusion from experiments of this kind is that the individual bile constituents, *e.g.*, bilirubin, cholesterin, and the bile salts, even in concentration equal to the maximum found in icteric blood, do not destroy the trypanocidal effect of the serum. Only sodium glycocholate in a concentration of 0·2 per cent. exerted an inconstant effect, and such a concentration is scarcely ever reached, even in the most severe jaundice. The disappearance of the trypanocidal power of the serum in mechanical jaundice is, therefore, not due to primary toxicity of the bile constituents. The fact that of all the diseases of man only icterus accompanying disease of the liver, and severe liver disease without icterus produce this effect, suggests the conclusion that the trypanocidal power of human serum stands in the closest relationship with the functional activity of the liver, and that in all probability the liver is the place of formation of the trypanocidal serum bodies.

The authors are consequently of opinion that they have succeeded in demonstrating a new physiological function of the liver, and, at the same time, a sero-diagnostic method of examining the liver function.

W. Y.

PINTO (Cesar). **Contribuição ao estudo da transmissão dos trypanosomas pelos hirudineos. (Nota prévia.)** [Study of Transmission of Trypanosomes by Leeches. (Preliminary Note.)]—*Brazil Medico.* 1921. Apr. 23. Year 35. Vol. 1. No. 17. pp. 205–206. With 1 text fig.

The author refers to work of E. von BASSEWITZ on the transmission of *Trypanosoma equinum* by the bite of *Haementeria officinalis* Filippi.

In 1911, Astrogildo MACHADO found *T. rotatorium* parasitic in the frog, *Leptodactylus ocellatus*. After examination of the blood of frogs from the neighbourhood of Manguinhos, the author confirms his findings. He has attempted further experiments with the object of discovering whether *Haementeria lutzi* can transmit the trypanosome. Leeches sucking infected frogs were examined daily. The forms of Crithidia found in their digestive organs were identical with those observed by DOFLEIN in cultures of *T. rotatorium in vitro*, showing, in the author's opinion, that this trypanosome can develop in *H. lutzi*. To withdraw blood from the digestive organs of the leech, he washes the ventral surface with physiological solution and inserts a fine needle into the caecum, gently compressing the body of the animal.

Leeches of the genus *Haementeria* are parasitic on the higher animals in Mexico, Paraguay and Brazil (*Haementeria officinalis* Filippi); *H. ghilianii* Filippi, in Para, Amazonas, Colombia, Chile, the Argentine and Paraguay; *H. lutzi* Pinto, in the States of Minas Geraes, Rio de Janeiro, Sao Paulo and Parana.

A. G. B.

SANI (Luigi). **Sull'isolamento dei tripanosomi del sangue.** [On the Isolation of Trypanosomes from the Blood.]—*Ann. d' Igiene.* 1921. Sept. Vol. 31. No. 9. pp. 536–544.

Reference is made to the difficulty which is experienced in obtaining trypanosomes free from other bodies. The author discusses in detail the various methods which have been devised by different investigators, and points out objections to each of them; he eventually decided to employ a haemolytic and leucolytic serum specific for the blood of the animal from which he proposed to obtain the trypanosomes, *i.e.*, the dog. A haemolytic serum was prepared by injecting well-washed dog's erythrocytes and leucocytes into rabbits. It was found that the serum thus obtained did not possess a very marked haemolytic action on dogs' blood, and the reason for this was probably the extraordinarily high degree of agglutinating power which it possessed and which interfered with the lytic action.

The technique finally adopted was briefly as follows:—Blood was withdrawn from a dog at the height of the infection, added to an equal volume of 1·5 per cent. sodium citrate solution, and centrifuged at low speed (700 revolutions per minute) for 5 to 10 minutes. In this way the majority of the erythrocytes were sedimented, while the trypanosomes and leucocytes remained in suspension. The supernatant fluid was then decanted and centrifuged at as high a speed as possible, until the trypanosomes, leucocytes and remaining red cells were sedimented. The deposit was removed, diluted with 20 times its volume of normal saline, and then the specific haemolytic serum and complement added in proper proportions and the mixture incubated at 37° C. for 20 minutes; on centrifuging the deposit is found to consist of trypanosomes. The parasites, which are morphologically intact and actively motile, are washed with physiological saline solution.

W. Y.

BECKWITH (T. D.) & REICH (W. W.). **The Variation in the Size of *Trypanosoma brucei* according to the Host.**—*Proc. Soc. Experim. Biol. & Med.* 1921. May. Vol. 18. No. 8. pp. 316–317.

The authors quote from the literature certain records which indicate that a certain species of trypanosome may show differences in size

according to the host infected; they point out, however, that there is much divergence of opinion on this matter.

A culture of *T. brucei* was obtained from NOVY and immediately upon receipt inoculated into a rat. On the death of the rat, a guinea-pig was inoculated with the heart blood, and on the death of the guinea-pig another guinea-pig and a white rat were inoculated. In this manner the host altered from time to time. The series of animals used included four rats and four guinea-pigs. Numerous films were made from heart blood as soon after death as possible, within an hour at most, and stained with Wright's stain. Measurements were then made by means of a properly calibrated series of lenses and with a filar micrometer. By this means 100 individuals were examined from the guinea-pigs and 90 from the rats; all the parasites were in the fully developed stage with typical morphology. The average size of *T. brucei* was found to be $18 \cdot 46\mu \times 3 \cdot 16\mu$ in guinea-pigs, and $13 \cdot 25\mu \times 2 \cdot 23\mu$ in rats.

The conclusion is, that *T. brucei* does vary in size according to the host infected, and that it is markedly larger in the guinea-pig than in the white rat.

[This conclusion can hardly be accepted on the evidence furnished, for a number of reasons. The films were made after death, and it is well known that trypanosomes begin to disintegrate and change in shape shortly after the death of the host. We are not informed what the author means by *T. brucei*. Is NOVY's strain the old strain sent back by BRUCE from Zululand and described by PLIMMER and BRADFORD in 1899, or is it the polymorphic parasite now commonly known as *T. brucei*? If the latter, then the observation recorded above can be of little value, as attention has been frequently drawn to the fact that the long forms predominate on certain days of the infection and the short forms on others. Consequently, the results obtained by measurements of such comparatively small numbers as 100 and 90 individuals, chosen at random from four guinea-pigs and four rats, do not warrant the conclusion drawn by the authors.]

W. Y.

DIOS (R.) & OYARZÁBAL (J.). **Sobre estados endoglobulares en Tripanosoma del Surra** (*evansi*) **y en Tripanosoma del Mal de Caderas** (*equinum*). [Endoglobular Forms in *T. evansi* and *T. equinum*.]—*Rev. Inst. Bacteriolog.* 1921. Mar. Vol. 2. No. 6. pp. 113–120. With 3 plates and 5 charts. [Summary in English.]

The conclusions are :—

"With horses infected by way of experiment with Trypanosoma Surra and Mal de Caderas, besides Trypanosomes, interglobular forms were found [in] the organs of fallen animals and [exhibiting] some resemblance to Malaria-Plasmodies, and in the living blood as well. These forms, which had some resemblance to Malaria-Plasmodies and also to Piroplasma, are coloured with Giemsa in a typical manner. Control investigations in other horses yielded always negative results.

"As Piroplasmosis of horses is not known in the Argentine, and as these interglobular parasites were exhibited following experimental infection with Trypanosomes, it appears that we have to deal with a phase of interglobular evolution of the Trypanosomes."

[This paper is illustrated by four excellent plates. In the reviewer's opinion, the intracorpuscular bodies have nothing to do with the trypanosomes, but appear clearly to belong to the Piroplasma group.]

W. Y.

i. UNNA (P. G.) & WISSIG (E. Th.). **Das Histon des Trypanosomenkerns.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 141–144.

ii. MAYER (Martin). **Bemerkungen zu obiger Erwiderung.** [UNNA & WISSIG.]—*Ibid.* pp. 144–145.

iii. OESTERLIN (Ernst). **Bemerkungen zu P. G. Unnas und E. Th. Wissigs Erwiderung auf meine Arbeit zur Chemie des Trypanosomenkerns.**—*Ibid.* No. 6. pp. 183–185.

i. This paper is a reply to Oesterlin, who has criticized previous work of Unna and TEILEMANN on the chemical nature of the trypanosome nucleus [this *Bulletin*, Vol. 15, p. 48, and Vol. 16, p. 376]. The authors have repeated the observations of Unna and TEILEMANN on the effect of 12 hours exposure of freshly made trypanosome films to a saturated solution of silver sulphate, and find that the nucleus was dissolved ; furthermore, they found even 0·5 per cent. solution of silver sulphate was sufficient to cause disappearance of the nucleus. For these and other reasons they hold, notwithstanding the work of Oesterlin, that the nucleus of *T. gambiense* gives the reactions of histon.

ii. Mayer writes that he has controlled all Oesterlin's findings and has examined some of his preparations. On account of Unna and Wissig's rejoinder, he has tested the effect of accurately prepared saturated silver sulphate solution on many trypanosome films, and in contradistinction to Unna and Wissig has, like Oesterlin, always obtained good nuclear staining with Giemsa's stain. For this and other reasons, Mayer agrees with Oesterlin that the histon nature of the trypanosome nucleus has not been proved.

W. Y.

JENSEN (E. T.). The Cure of Sleeping Sickness. [Correspondence.]—*Brit. Med. Jl.* 1921. Nov. 12. p. 814.

——. Trypanocide [Correspondence.]—*Lancet.* 1921. Nov. 12. pp. 1025–1026.

YORKE (Warrington). The Cure of Sleeping Sickness. [Correspondence.]—*Brit. Med. Jl.* 1921. Nov. 19. pp. 865–866.

——. Trypanocide. [Correspondence.]—*Lancet.* 1921. Nov. 19. p. 1077.

TROPICAL DERMATOLOGY.

DE MELLO (Froilano). *Tricophyton viannai*, **n. sp., the Infecting Agent in a Case of Dermatomycosis.**—*Indian Jl. Med. Res.* 1917. July. Vol. 5. No. 1. pp. 222–233. With 1 plate and 7 text figs. [Received Feb. 1920.]

The patient was a Mozambique soldier with a mycotic eruption in the groin and on the abdomen; the hairs appeared to have escaped infection. Cultural tests revealed the presence of a Tricophyton growing a purplish culture on Sabouraud's media; the organism was submitted to SABOURAUD himself, who regards it, in a note published with this paper, as a new species in his experience. The author contributes a very full description of its mycology.

E. G. Graham Little.

VON BASSEWITZ (E.). **Calôr de figo. (Contribuição ao estudo das dermatomycoses brasileiras.)**—*Arch. Rio Grandenses de Med.* Porto Alegre. 1920. Mar. Vol. 1. No. 2. pp. 55–58.

"Calôr de figo," literally "fig fever," is a dermatomycosis attacking the plantar regions chiefly in coloured individuals who dispense with any foot covering. The author explains the curious name as follows: Calôr, heat or fever, refers to the burning and intense irritation felt by the sufferer. The term "figo" apparently has reference to the fissures on the affected parts, which resemble the cracks on the surface of a thoroughly ripe fig. The affection is of chronic evolution and is common in the country districts of the state of Rio Grande do Sul. The chief clinical features are hyperkeratosis, fissures, depigmentation of the parts affected, and secondary mycoses of the nails. The affection may spread to the palmar surface of the hands. The chief symptoms are pain and itching, worse during the dry season. The pathogenic agent is a fungus of the genus *Trichophyton*.

F. S. Arnold.

ESCOMEL (E.). **Contribution à l'étude de quelques mycoses au Pérou.**—*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. pp. 663–671. With 7 text figs.

——. **Contribución al estudio de algunas micosis en el Perú.**—*An. Facul. de Med. de Lima.* 1920. Sept.–Oct. Vol. 6. No. 17. pp. 95–100. With 6 text figs.

The first note describes a case of extensive mycotic eruption in a boy of 15, in the form of red patches from which a fungus was obtained with the botanical characters of Penicillium. The second note deals with a case of trichophytosis limited to the toe-nail of the right hallux, from which a characteristic fungus was demonstrated. The third note relates a case of "onychogryphosis" of all the toe-nails in a lady; fungus was found in scrapings and a culture on carrot allowed of its identification as a Penicillium. The fourth note describes a case of Madura foot, with "white grains" and abundant mycelium.

E. G. G. L.

HORTA (Parreiras). **Sobre um caso de Tinha preta e um novo cogumelo.** (*Cladosporium Wernecki*). [Notes on a Case of Tinea nigra and on a New Organism associated therewith, *Cladosporium Wernecki*.—*Rev. Med.-Cirurg. do Brazil.* 1921. June. Vol. 29. No. 6. pp. 269–274.

The patient, a white man of 47, presented black patches on the left hypothenar region and wrist and on the right thenar region. Clinically the affection was indistinguishable from that described under the designation Tinea nigra by MANSON in China, and by CASTELLANI and CHALMERS in India, Ceylon and Java. This, however, was not the case with the organism isolated from the black plaques and cultivated with a few colonies of staphylococci. The parasite differed from *C. mansoni*, described and cultivated by CASTELLANI, in its appearance in the scales, and in a yeast-like appearance of its cultures in an early stage of growth. Holding that the organism differs from all similar ones hitherto described, the author names it *Cladosporium Wernecki*.

F. S. Arnold.

DUFOUGÉRÉ (W.). **Les dermato-mycoses de la Guyane française.**—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 354–357.

Dufougéré reports seven cases of a framboesioid dermatomycosis in the purulent discharge of which an organism was obtained and proved to be a mould with yeast-like bodies and mycelia, which the author regards as probably identical with *Cryptococcus Gilchristi* ("blastomycosis"). No inoculation experiments could be made. Iodide of potassium in large doses produced a speedy cure.

E. G. G. L.

SPAAR (Eric C.). **Notes on** *Monilia metalondinensis* **(Castellani, 1916) and** *Epidermophyton rubrum* **(Castellani, 1909).**—*Jl. Trop. Med. & Hyg.* 1921. May 2. Vol. 24. No. 9. pp. 126–127. With 2 text figs.

The first case was a Singhalese girl, aged 15, with an extensive milky growth on the hard palate, which it almost entirely covered. Cultures obtained from this allowed of the classification with *Monilia metalondinensis* of CASTELLANI. The second case was that of an itchy eruption on the buttocks of a planter. Scrapings showed a fungus and culture on Sabouraud media demonstrated the fungus to be *Epidermophyton rubrum* Castellani.

E. G. G. L.

ROHR (Carlos). **Algumas observações sobre "Otomycose."**—*Arch. Brasileiros de Med.* 1921. Jan. Vol. 11. No. 1. pp. 11–15.

Accounts of nine cases in which mycotic growths were found in the auditory meatus. In three of the cases the organism found was *Aspergillus flavus*; *Aspergillus glaucus* and a new species of Aspergillus were detected once apiece; *Sterygmatocystis niger* was found in three cases, in one associated with *Rhizopus nigricans*. In one case the organism was not identified. The treatment adopted consisted of applications of tincture of iodine after removal of the growths.

F. S. Arnold.

DA MATTA (Alfredo). **Consideraciones sobre un caso de Posadasia coccidioidica. (Blastomicose.)**—*Amazonas Med.* Manaos. 1920. Vol. 3. Nos. 10–11. pp. 41–51. With 1 plate.

After an historical introduction, in the course of which the author claims general priority for POSADAS and states that the first report of a case of coccidial blastomycosis in Brazil was by LUTZ (*Brazil Medico*, 1908), the author details the clinical history of a case occurring in an agricultural labourer of 50.

The disease affected the mouth, tongue, lips, cheeks and cervical region. The ulcerated surfaces caused intense suffering and the patient's general health was much impaired. The patient was treated by intravenous injections of a 10 per cent. solution of iodide of sodium, 2 to 4 grammes of the salt being injected at intervals of two days. Injections of the same solution were also made into the diseased tissues of the face. Disinfection of the oral lesions was carried out by means of nascent iodine by the following method: two solutions were used in succession for rinsing the mouth and gargling, the first consisting of a teaspoonful of a 1:30 solution of sodium or potassium iodide in a tumblerful of water, the second of a dessertspoonful of a 12 vol. solution of hydrogen peroxide in another tumbler of water. Lavage of the nasal fossae was carried out with the same solutions. This treatment was completely successful in bringing about a cure, as is seen in the plate showing photographs of the patient before and after treatment.

F. S. Arnold.

DE MELLO (Froilano). *Epidermophyton salmoneum*, **n. sp., agent d'une épidermophytie inguinale dans l'Inde portugaise.**—*C.R. Soc. Biol.* 1921. Jan. 29. Vol. 84. No. 4. pp. 239–240.

In 35 cases of an inguinal dermatomycosis the author identified the *Epidermophyton cruris* vel *inguinale*. In one case cultures proved the presence of a new species, giving a salmon-coloured growth on Sabouraud media.

E. G. G. L.

GOMES (José Maria). **Dermatophytos:** *Trichophyton rosaceum; Trichophyton equinum.*—*Ann. Paulist. Med. e Cirurg.* 1921. Feb. Year 9. Vol. 12. No. 2. pp. 39–40.

This paper opens with some considerations concerning the parasitic dermatoses observed by the author in the course of three years work in the out-patient department for diseases of the skin at the Santa Casa Hospital of São Paulo, and goes on to give histories of two patients whose symptoms were caused by fungi not commonly met with in Brazil. With regard to the relative frequency of occurrence of different fungi, the author states that *Epidermophyton* and *Trichophyton* were found only in few cases, while Achorion and Microsporon were each responsible for many, the species being invariably, in the former case, *Achorion Schönleini* and in the latter, *Microsporon lanosum*. Of the cases reported the first is that of a Swiss aged 37, whose face, neck and scalp presented numerous scaly erythematous patches. Cultures from the scales in Sabouraud's medium and on potato showed typical growths of *Trichophyton rosaceum*. The second case is that of a German with symptoms of sycosis of the beard. Cultures of the pus in Sabouraud's medium

gave ashen-white colonies which were thought at first to be *Trichophyton asteroides.* Sown on potato, however, the pus gave the moist, ochreous streak stated by MATRUCHOT and DASSONVILLE, who first studied and described the organism, to be typical of *Trichophyton equinum.*

F. S. Arnold.

GOMES (J. M.). **Dermatite verrucosa. Um novo caso.** *Bol. Soc. Med. e Cirurg. de S. Paulo.* 1921. Mar.–Apr. Vol. 4. 2nd Ser. Nos. 1–2. pp. 26–27. With 4 plates.

An account of a case of warty dermatitis in which the lesions involved the whole left foot and leg and spread in separate islets up the thigh. Cases of the kind are not uncommon in the interior of Brazil, where its popular name is *formigueiro* (anthill). Cultural experiments led to the identification of the causative organism as *Phialaphora verrucosa.* The four plates show respectively the extensive warty dermatitis involving the patient's left leg, a tube culture of *Phialaphora verrucosa* in glycerinated potato, the same organism *in situ* in the tissues and finally, the fructification of the organism in the hanging drop.

F. S. Arnold.

SILVA (Linneu) **Sobre um caso de ulcera ecthymatoide pre-lacrimal esporotrichosica com lymphangite gommosa da face.**—*Brazil Medico.* 1921. Sept. 10. Year 35. Vol. 2. No. 9. pp. 115–118. With 3 text figs.

Clinical history of a case of gummatous sporotrichosis in a white patient (male) 27 years of age. The primary lesion appeared near the inner canthus of the left eye and spread over the bridge of the nose and on to the upper eyelid. Other typical lesions developed in a chain on the cheek and the submaxillary and pre-auricular lymphatics became enlarged. Culture experiments showed that the organism present was a sporotrichum; species not stated. Potassium iodide, in doses commencing at 30 grains daily and gradually rising to 75 grains, having brought about in a month almost complete disappearance of the lesions, the patience discharged himself from hospital aud failed to report the final result of treatment.

F. S. Arnold.

SRIVASTAVA (A. N.). **Pathology of Ringworm and Allied Skin Diseases.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 213–214.

Srivastava recommends the application of 6·9 per cent. dilute nitric acid in ringworm of the skin.

E. G. G. L.

LUHN (O. G. F.). **Brief Note on the Treatment of Tinea imbricata.**—*Jl. Trop. Med. & Hyg.* 1921. Aug. 1. Vol. 24. No. 15. pp. 206–207.

Luhn found the following formula the most effective in the treatment of *Tinea imbricata*:—acid sal., 1 part; glacial acetic acid, 1 part; sp. v. meth., 9 parts.

E. G. G. L.

DE NOOY (J. A.). [In Dutch and English.] **Een geval van autochthone infectie met actinomyces.—A Case of Autochthonous Infection with Actinomyces.**—*Meded. v. d. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 3. pp. 146–155. With 3 plates.

Case of a planter in Java who accidentally cut his foot rather deeply, through putti and boot, with an axe. He applied a first dressing of chewed alang-alang grass (*Imperata exalta*, a native remedy) and then rode home and washed the wound with lysol and dusted it with iodoform. The wound did not heal well, even with rest; but after treatment by a surgeon, who removed a splinter thought to be bone, it closed in about a fortnight.

About a month and a half later there appeared near the scar a swelling which broke and discharged a little serous pus and blood but healed under a sublimate dressing; subsequently, similar swellings running a similar course appeared at intervals of six or eight weeks or even —when work had been unusually easy—of three months.

An operation was at last performed; nothing was found, but the wound did not heal well, and small abscesses formed in its neighbourhood, so that about a month afterwards another operation was carried out which again disclosed nothing remarkable.

Subsequently another swelling formed—indurated and of a blue-red colour—and when this burst actinomyces granules were found in the pus. These were cultivated and cultures were subsequently inoculated into guinea-pigs and mice, to a certain extent successfully, swellings forming which sometimes disappeared and sometimes burst and healed; pus from the latter contained Gram-positive short rods, and when plated on agar ultimately gave issue to typical colonies.

No complement-fixation or agglutinizing substances could be demonstrated in the patient's serum by using suspensions of cultures as antigen.

The patient was treated with potassium iodide, which he did not strictly adhere to, and a relapse occurred after about seven months.

The author considers that the fungus, which is figured, belongs to the same group as *Actinomyces asteroides* of EPPINGER and *A. caprae* of SILBERSCHMIDT.

A. Alcock.

DE MAGALHAES (P. S.) **A propos des mycoses.**—*Rev. Méd. et Hyg. Trop.* 1921. Vol. 13. No. 1. pp. 17–22.

De Magalhaes raises a protest against the confused terminology and classification of the Mycetomata, rendered more confused in his opinion by the proposed classification of CHALMERS and ARCHIBALD, who included in the group Actinomycoses. He proposes a new term "mycetosis" to include mycotic affections producing peculiar grains and presenting the aspect of tumours more or less circumscribed. For the moment it is impossible to make a valid classification of mycetoma.

E. G. G. L.

DA SILVA (Pirajá). **Contribuição à micologia parasitária do Brasil (Duas novas espécies de fungos produtores de maduromicose).** [Contribution to the Parasitic Mycology of Brazil.]—*Mem. Inst. de Butantan.* São Paulo. 1918–19. Vol. 1. No. 2. pp. 187–205. With 5 plates. [English summary p. 205.]

Two cases of Madura foot occurring in Bahia are described. The first was a mycetoma with white granules, giving cultural characteristics

which the author considers rank it as a new species, which he names *Discomyces bahaiensis.* The second case gave black granules; these also developed cultural characters marking it as a new species of Madurella, which he proposes to name *Madurella Ramiroi.* Experimental inoculation in both cases failed with pigeons, rats and bats.

E. G. G. L.

MONTPELLIER (J.) & GOUILLON (P.). **Mycétome du pied (type pied de Madura) dû à l'***Aleurisma apiospermum.*—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 285–290. With 1 plate.

Montpellier and Gouillon report a new case of Madura foot, which was demonstrated to be caused by an extremely rare mould, *Aleurisma apiospermum.* The patient, a Kabyle man aged 35, sustained a slight abrasion of the left foot which developed into a typical condition of mycetoma. Yellowish-white grains were demonstrated which showed when crushed mycelial threads and spores. Cultures were readily obtained on all sorts of media, and these are described minutely. The organism was classified by Prof. MAIRE as a Deuteromyces and the authors, basing themselves on VUILLEMIN and MAIRE, rank it as *Aleurisma apiospermum.*

E. G. G. L.

MONTPELLIER (J.) & LACROIX (A.). **Encore un mycétome du pied, type "Pied de Madura," observé en Algérie, et dû au** *Nocardia madurae.*—*Bull. Soc. Path. Exot.* 1921. July 13. Vol. 14. No. 7. pp. 357–359.

Montpellier and Lacroix report a case of Madura foot in a native Kabyle woman aged 45, in whom yellowish-white grains were demonstrated, and the fungus proved to be Nocardia of Vincent.

E. G. G. L.

WELCHMAN (W.) & PIRIE (J. H. Harvey). **A South African Case of Mycetoma ("Madura Foot") caused by** "*Nocardia indica* (*Discomyces Madurae*)."—*Med. Jl. S. Africa.* 1921. Aug. Vol. 17. No. 1. pp. 6–9.

The patient was a male South African native, aged 66. His right foot was greatly swollen, the swelling having been present for only nine months. He had always lived in the Transvaal. Numerous sinuses opened from the foot and in these a sero-purulent discharge collected in which yellowish white granules were found; these were demonstrated to contain abundant filaments of a Nocardia which subsequent cultural tests proved to have the characters of *Nocardia* or *Discomyces indica.* The authors emphasize three points of interest. (1) The subinguinal glands were swollen and primary cultures were obtained from them. Glands are rarely thus involved. (2) When the foot was amputated the stump became secondarily infected; this infection was eliminated apparently as a result of injection of novarsenobillon. (3) This appears to be the first recorded case of South African *Nocardia indica.*

E. G. G. L.

BOYD (Mark F.) & CRUTCHFIELD (Earl D.). **A Contribution to the Study of Mycetoma in North America.**—*Amer. Jl. Trop. Med.* 1921. July. Vol. 1. No. 4. pp. 215–289. With 18 text figs. and 1 map.

In this admirable review a protest similar to that made by DE MAGALHAES is raised by Boyd and Crutchfield, who also take the view that the category has become too much enlarged by the inclusion of Actinomyces. These authors pass in review all the cases recorded in the United States and in Mexico (30 in all). The practice of walking barefoot would seem to play an important part in etiology. Types of onset do not differ materially from those described in Vandyke CARTER's original memoir of the disease as it occurs in India. Very full descriptions are given of the external and internal changes in the foot, the histology of the skin and the forms of parasite. They report one case as giving a new specimen of growth, and propose to name it *Actinomyces mexicana*. A new species of *Allescheria* is described and figured in the tissues and in culture.

E. G. G. L.

MONTEL (L. R.). **Nodosités juxta-articulaires chez les Annamites. Traitement par le novarsénobenzol.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 554–556.

Montel, with an experience of four cases, states that syphilis was always present concomitantly with the nodules and the latter disappeared with injection of novarsenobenzol.

E. G. G. L.

POUPELAIN. **Les nodosités juxta-articulaires. Leur origine probablement syphilitique.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp. 548–553.

Six cases of this affection are described, in almost all of which there was evidence of syphilis. Novarsenobenzol injections were given and the nodosities disappeared or diminished *pari passu* with the syphilitic lesions. No Wassermann tests were made.

E. G. G. L.

POLIDORI (V.). **Un cas de nodosités juxta-articulaires.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1920. Aug. Vol. 11. No. 2. pp. 53–55. With 1 plate.

The patient was a male Chinese, aged 47, admitted for a tuberculous osteoarthritis, nodosities being also present near the joints. The blood was slightly positive to Hecht-Bauer tests. The patient died in hospital and a postmortem showed extensive tuberculosis. The nodosities were examined for bacteria with negative results.

E. G. G. L.

i. DA MATTA (Alfredo). **Primeiros casos de nodosidades de Lutz-Jeanselme no Amazonas.**—*Brazil Medico.* 1921. July 30. Year 35. Vol. 2. No. 3. pp. 26–28. With 1 text fig.

ii. SILVA (Flaviano). **Nodosidades juxta-articulares de Lutz-Jeanselme.**—*Ibid.* 1920. Oct. 16. Year 34. No. 42. pp. 687–689. With 1 text fig.

i. After a discussion of the question of priority, in the course of which the author states that Adolpho LUTZ has an indefeasible claim to priority in the matter, he having described cases of symmetrically situated juxta-articular nodules occurring in inhabitants of the interior of Brazil as long ago as 1892 [see this *Bulletin*, Vol. 8, p. 238], seven years before JEANSELME's report of cases in Indo-China (Précis de Pathologie Exotique, 1909), the author gives clinical histories of two cases occurring in his own practice. Both recovered, with disappearance of the nodules, under anti-luetic treatment. The question of differential diagnosis is then dealt with, special attention being given, in this connexion, to the consideration of gummata, mycoses and parasitic tumours. The author states his general conclusions as follows :—

1. The juxta-articular nodules of Lutz-Jeanselme should be so named in due homage to LUTZ, the Brazilian savant who first observed them (1892), and JEANSELME, the French tropicalist, who gave a masterly description of them from the clinical and anatomo-pathological point of view.

2. That the nodules are met with exclusively in syphilitic subjects is a fact testified to by F. TERRA (Rio de Janeiro), PAPELAIN (Sze-Chuan), L. R. MONTEL (Saigon), H. FOLEY and L. PARROT (Algiers) and A. da MATTA (Amazonas).

3. The infection of syphilis, therefore, should be recognized as the etiological basis of the nodules. They are para-syphilitic manifestations having their seat in the integuments.

4. Specific treatment and, in many cases, "914" alone, quickly modifies the consistence of the nodules and causes their more or less rapid re-absorption and disappearance.

ii. A description, with figure, of a case of juxta-articular nodosities in a coloured woman of fifty.

[Juxta-articular nodules have been attributed to mycosis and to yaws (DAVEY, MOUCHET & DUBOIS).—ED.]

F. S. Arnold.

FOLEY (H.) & PARROT (L.). **Vingt et un cas de nodosités juxta-articulaires observés en Algérie. Considérations cliniques et étiologiques.** —*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 64–79. With 6 illustrations.

—— & ——. **Nodosités juxta-articulaires chez les indigènes d'Algérie.** —*Bull. Soc. Path. Exot.* 1920. Nov. 10. Vol. 13. No. 9. pp. 738–741.

The authors have observed 21 cases of this condition which they regard as identical with the disease described by JEANSELME in Indo-China. The nodules are rare before the age of 30 years ; they are found chiefly near the larger joints ; the tumours are painless, of cartilaginous consistence, not adherent to the skin, more or less adherent to the subcutaneous tissues. They vary in size from that of a pea to that of a duck's egg and are usually multiple. Usually they undergo no change, but occasionally they soften and break down like gummata.

Histologically, the tumours consist of isolated nodules of fibrous tissue. The blood vessels are often sclerosed and sometimes calcified. The authors regard syphilis as the most probable explanation of the lesions. In one case mercurial treatment was followed by a manifest diminution of tumours. The 21 cases are reported in considerable detail and there is a useful bibliography.

E. G. G. L.

McCord (Carey P.), Kilker (C. H.) & Minster (Dorothy K.). **Pyrethrum Dermatitis. A Record of the Occurrence of Occupational Dermatoses among Workers in the Pyrethrum Industry.**—*Jl. Amer. Med. Assoc.* 1921. Aug. 6. Vol. 77. No. 6. pp. 448–449.

Pyrethrum is an insecticide powder made from the flowers of three varieties of chrysanthemum coming principally from the Caucasus, Persia and Dalmatia. The dermatitis noted in those handling the powder is much worse in the summer owing to perspiration of the workers' bodies. The dermatitis could be prevented by measures of personal cleanliness, and avoidance of contact by improvements in machinery.

E. G. G. L.

Gonçalves (Nicanor Botafogo). **Tratamento da ulcera tropical. O chenopodio como agente antiseptico e cicatrizante.**—*Brazil Medico.* 1920. Apr. 24. Vol. 34. No. 17. pp. 267–268.

The author states that he has had excellent results from the treatment of tropical ulcers by chenopodium and that he finds it to possess very high microbicide and cicatrizing powers. His method is to cover the ulcer with a fine gauze and to let fall on to the latter a few drops of a solution of chenopodium in glycerine (1 minim to each cc.). The method is simple, efficacious and readily available in country districts.

F. S. Arnold.

Howard (Robert). **The Surgical Treatment of Ulcus tropicum.**—*Jl. Trop. Med. & Hyg.* 1920. Sept. 1. Vol. 23. No. 17. pp. 215–216.

The treatment here recommended is scraping away under an anaesthetic all sloughs and softened tissue with a Volkmann's spoon; cutting away ragged edges; washing with antiseptic. The site is packed with cyanide gauze and antiseptic wool and the whole firmly bandaged. The next dressing is made 48 hours after. Thiersch grafting may be necessary in large areas.

E. G. G. L.

Amaral (Afrânio). **Contribuição ao tratamento das úlceras atónicas e fagedénicas.** (**Do emprêgo do sôro normal sêco.**) Contribution to the Treatment of the Atonic and Phagedenic Ulcers. The Employment of Dried Normal Serum.] *Mem. Inst. de Butantan.* 1918–19. Vol. 1. No. 2. pp. 209–231. With 9 plates. [English summary p. 229.]

The treatment recommended is the application to the ulcer of normal dried serum without any antiseptics. Under this treatment in phagedenic ulcer the destruction of the fuso-spirochaetal combination (Vincent's) can be observed and the ulcers cicatrize quickly.

E. G. G. L.

CLÉMENT. **Observation de 35 cas d'ulcère phagédénique des pays chauds.**—*Bull. Soc. française de Dermat. et de Syph.* 1921. No. 2. pp. 64–65.

——, DONATO (Jean) & PARET (Paul). **L'ulcère phagédénique des pays chauds.**—*Ann. Dermat. et Syph.* 1921. 6th Ser. Vol. 2. No. 4. pp. 177–183.

Clément contributes a short paper founded on the observation of 35 cases of phagedenic ulcer in natives. The clinical characters included a cup-like ulceration surrounded by a hard raised edge, filled with necrosed tissue and blood clot, emitting a corpse-like smell, and affecting soft parts, tendons, joints and bones, with little glandular invasion and no ill effect on the general health. In nearly all the cases Vincent's organisms were demonstrated. The joint paper deals with the same series of cases.

E. G. G. L.

NORMET; MARZIN (G.) & GAMBIER (A.); DE GOYON & LE VILAIN. **Traitement de l'ulcère phagédénique des pays chauds.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 107–113.

Normet prefers powdering the ulcer thickly with iodoform, and then passing a red-hot thermo-cautery over the surface until a black crust covers the whole ulcer, which is then dressed with eau d'Alibour (1/3). Cauterization is repeated every two days until healing is advanced.

Marzin and Gambier prefer the method introduced by DUBREUILH, of fitting a sheet of zinc closely into the ulcer and bandaging over it, the patient being kept in bed. If there is much necrotic debris in the ulcer this is removed by wet dressings until the zinc plate can be applied.

De Goyon and Le Vilain advocate treatment by powdering the ulcer with Vincent's powder (Calc. hypochlorite 1, boric acid 9) and bandaging over, leaving the dressing undisturbed for two to three days, or better still, with daily dressings with Dakin's fluid, of which the following formula is given :—

Dry carbonate of soda	140 gm.
Or crystallized do.	400 gm.
Chloride of lime	200 gm.
Ordinary water	10 litres.
Soak, filter and add :	
Boric acid	40 gm.

E. G. G. L.

FOX (E. C. R.). **Naga Sore.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 694–699. With 4 plates.

"Naga sore" is endemic, and sometimes becomes epidemic, in Assam. Clinically it must be classed with "tropical ulcer" or "tropical phagedena." Smears show enormous numbers of fusiform bacilli, with occasional spirochaetes and almost constantly staphylococci, diplococci and streptococci. The fusiform bacilli, probably identical with Vincent's organism, failed to grow on ordinary media, aerobically or anaerobically, but were successfully cultivated by the

technique of KRUMWIEDE and PRATT. The spirochaetes resemble morphologically the *Sp. Vincenti.* All cocci were Gram-positive. The epidemics are probably caused by infected flies (*Siphonella funicola*).

E. G. G. L.

GUPTA (J. M. Sen). **Cachar Sore and its Treatment.**—*Indian Med. Gaz.* 1921. Jan. Vol. 56. No. 1. pp. 13–15.

Cachar sore (synonyms Naga sore, Assam sore), an ulceration very common in Assam, was investigated by Gupta, who found in the discharge "enormous numbers of bacilli," not identified, and no other organism. Leishman-Donovan bodies were never found, but the author considers that the notable clinical improvement under injection of tartar emetic justifies him in regarding this ulceration as a leishmaniasis.

E. G. G. L.

EDGE (B. E.). **Chronic Tropical Ulceration in Europeans.** [Correspondence.]—*Lancet.* 1921. June 18. p. 1327.

Edge, from his experiences in Cocos and Perim, combats the view expressed by CASTELLANI and STITT that these conditions are "mostly syphilitic," and expresses his conviction that "deficiency" in diet is a more probable cause. A free supply of fresh vegetables and fish reduced the trouble by 50 per cent. in Cocos.

E. G. G. L.

CRICHLOW (Nathaniel). **Two Cases of Gangosa in Natives of the Solomon Islands, Western Pacific.**—*Jl. Trop. Med. & Hyg.* 1921. Mar. 15. Vol. 24. No. 6. pp. 74–76. With 2 text figs.

The chief interest of this paper lies in the results of treatment. In the first case, an adult male, with the typical ulceration of the nose and upper lip and hard palate, intravenous injection of ½ cc. of colloidal antimony, repeated at three-day intervals, was followed by complete healing within three weeks, but 5 gr. doses of Pot. iod. *ter die* had also been given. In the second case, also an adult male, three doses of 15 cgm. of galyl were followed by complete healing. [No mention is made of any attempt to exclude syphilis in either case.]

E. G. G. L.

CUMMING (H. Lovett). **Ulcerating Granuloma of the Pudenda cured by Intramuscular Injections of Antimony Tartrate.** *Brit. Med. Jl.* 1920. Nov. 20. pp. 775–777.

The patient was an American suffering at the time from a chronic gonorrhoea, as well as from an ulceration of the penis, without any corresponding glandular enlargement. Donovan's corpuscles were found in the ulcer. Intramuscular injections, after a formula given by CASTELLANI and CHALMERS, were used :—

Tartar emetic	gr. viij
Acid. carbol.	♏ x
Glycerine	ʒ iij
Distilled water to	℥ j

nine minims of this being injected into the buttock at intervals of two days, a mixture (2 drachms *ter die*) of the following formula being at the same time given by the mouth :—

Tartar emetic	gr.	v
Sod. bicarb.	gr.	xxx
Glycerine	℥	j
Aq. chloroformi	℥	ij
Aq.	℥	iij

Healing was evident after the fourth injection and was complete within six weeks.

E. G. G. L.

Pupo (Aguiar). **Granuloma venereo, seu tratamento especifico pelo tartaro emetico.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1920 & 1921. Oct.–Feb. Vol. 3. (2nd Ser.) Nos. 8–12. pp. 294–298.

The chief feature of interest in this paper is the description of the treatment of Granuloma venereum by endovenous injections of tartar emetic as carried out in Brazil by Gaspar Vianna and Aragao. The drug is given dissolved in physiological saline, the dose varying from 0·05–0·12 cgm. in 5–12 cc. The injections are administered every other day, commencing with 5 cc. and increasing by 1 cc. at each injection until a dose of 10 cc. is reached. The secretions are diminished from the commencement of the treatment, and cicatrization commences both at the margin and in the centre of the ulcers with the fourth injection, proceeds rapidly, and is generally complete after from 15 to 25 injections. Donovan's corpuscles disappear from the lesions before cicatrization is complete.

F. S. Arnold.

Campbell (Meredith F.). **Granuloma inguinale.**—*Jl. Amer. Med. Assoc.* 1921. Mar. 5. Vol. 76. No. 10. pp. 648–651. With 4 text figs.

Campbell reports five cases, all in negroes, in four of whom an encapsulated bacillus was demonstrated. Treatment by intravenous injection of 1 per cent. tartar emetic was practised in all, but the author could only record one " cure."

E. G. G. L.

Giblin (W. E.). **Tartar Emetic for Venereal Granuloma.**—*Brit. Med. Jl.* 1921. June 25. p. 932.

Giblin claims to have treated 84 cases of this condition in eight months, with completely satisfactory results, using intravenous injection of tartar emetic (1 per cent.), 10 cc. given twice weekly for 10 injections. After an interval of ten days, five more injections are given.

E. G. G. L.

REED (W. A.) & WOLF (Monroe). **Preliminary Report on Treatment of Granuloma inguinale with Exhibit of Cases.**—*New Orleans Med. & Surg. Jl.* 1921. July. Vol. 74. No. 1. pp. 25–35. With 5 text figs.

A brief but very useful survey of the views on the bacteriology of this condition precedes the consideration of the authors' cases. The disease has probably existed, unnoted, in the United States for many years; it occurs practically only in the coloured race and is usually mistaken for syphilis. The clinical symptoms are nearly always the same: it begins with one or more small, very slightly indurated papules which soon break down, leaving a red granulated area with a slightly elevated surface and edges and very little induration. Involvement of glands practically never occurs. The usual site of the disease is the genital area, but it may occur on the face and neck, and in one of the authors' cases was noted in the mouth. The duration is always chronic. No treatment can compare in efficacy with intravenous injection of tartar emetic. Five cases are described in detail.

E. G. G. L.

LYNCH (Kenneth M.). **Granuloma inguinale (Granuloma venereum; Granuloma of Pudenda; Ulcerative Vulvitis; Serpiginous Ulceration of Genitals, etc.).**—*Jl. Amer. Med. Assoc.* 1921. Sept. 17. Vol. 77. No. 12. pp. 925–929. With 11 text figs.

Lynch reports nine cases from Charleston, S.C., under the general title Granuloma inguinale. Three of these (two negroes and one white) were uncomplicated cases in which Donovan bodies were abundantly present. In the other six cases Donovan bodies were found, but there was evidence as well of syphilis in five cases and microscopical evidence of epithelioma in one. Injections of tartar emetic were successful in the three first cases, but in the other cases failed to influence the concomitant disease, which called for other treatment.

E. G. G. L.

TAMURA (Harukichi). **On Creeping Disease.**—*Brit. Jl. Dermat. & Syph.* 1921. Mar. & Apr. Vol. 33. Nos. 3 & 4. pp. 81–102; 138–151. With 6 figs (2 plates).

This is a very important paper, the author having succeeded in extracting a live animalcule from the lesion, identified as Gnathostoma. The patient was a Chinese woman and the linear lesion was found on the right chest. The parasite was extruded from the advancing extremity of the line; it was 9 mm. long and 1 mm. wide; placed in human serum it made active movements for half an hour. Section of the linear lesion showed the tunnel excavated by the parasite to be chiefly in the epidermis but partly in the corium. The Gnathostoma was probably to be identified with *Gnathostoma siamense*. A very full review of the literature is given. [See also this *Bulletin*, Vol. 18, p. 116.]

E. G. G. L.

KLAUDER (Joseph Victor) & GREENBAUM (Sigmund S.). **Creeping Eruption (Larva migrans). Report of Case contracted at Wildwood, New Jersey.**—*Arch. Dermat. & Syph.* 1921. Apr. Vol. 3. No. 4. Pt. 1. pp. 377–382. With 5 text figs.

The patient was a little American girl aged six years; she had been playing in the sea sand of New Jersey, where the disease was probably

contracted. Raised erythematous linear lesions were found on each foot, in which the larva could be seen by diascopy, but could not be recovered. The condition was cured within five days by the application of tincture of iodine to the linear lesions.

E. G. G. L.

KETRON (Lloyd W.). **A Note on the Treatment of Larva migrans.**—*Arch. Dermat. & Syph.* 1921. Sept. Vol. 4. No. 3. pp. 368–369.

Ketron reports a case in a young man, acquired apparently while wading in sand in New Jersey. Two larval burrows were identified and were satisfactorily dealt with by freezing with ethyl chloride (one application).

E. G. G. L.

DYSON (William). **Camel Itch.**—*British Jl. Dermat. & Syph.* 1921. Mar. Vol. 33. No. 3. pp. 107–108.

An epidemic of a pruriginous eruption occurring among the personnel of a Camel Corps was investigated by the author. Preparations from the human skin revealed the female parasite occupying a hair follicle; the male parasite was not found. In scrapings from the camel male and female parasites resembling, but smaller than, the *Acarus scabiei* were easily found.

E. G. G. L.

MONTPELLIER (J.), DEGOUILLON & LACROIX (A.). **Note complémentaire sur la gale filarienne et son évolution.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 211–214.

The authors examined 800 Senegalese native troops, 156 of whom were carriers of mother-tumours of *Onchocerca volvulus*, or attacked by filarial itch; 150 of the 156 were in the latter class; 98 of the 150 had filarial cysts; only six of the 156, though carrying mother-tumours, had no eruption. The inference is therefore drawn that the presence of Onchocerca determined the eruption.

E. G. G. L.

LAWRENCE (Herman). **The Pathogenicity of the Demodex (Owen) in the Human Being.** *Med. Jl. Australia.* 1921. July 16. 8th Year. Vol. 2. No. 3. pp. 39–40.

The author very much doubts the general belief that Demodex is innocuous to man. As long ago as 1912 he exhibited at Rome a model of an impetiginous eruption which he attributed to Demodex. He has been consulted in cases resembling incipient lupus erythematosus, pityriasis alba, and molluscum contagiosum, where these conditions could be ascribed to the presence of this acarine and were removed by appropriate parasiticide treatment; and all his studies lead him to the conclusion that infestation with Demodex may be recognized in at least three degrees to which he would apply the terms "demodex impetigo," "demodex rosacea," and "demodex cysticum." He is not certain that the species harmful to man is always *D. folliculorum*.

A. A.

LLAMBIAS (J.) & LORENZO (D.). **Dermatose causée par un parasite du blé.**—*C.R. Soc. Biol.* 1920. Dec. 4. Vol. 83. No. 35. p. 1528.

Men dealing with sacks of wheat, in Cordoba and Santa Fé, in the month of March, suffered from an intensely irritant form of dermatitis, caused by the Tarsonemid mite *Pediculoides ventricosus*. The mites teemed in such numbers as to form a layer a centimetre thick on some of the sacks.

A. A.

STRANDBERG (J.). **Regarding an Unusual Form of Migratory Erythema caused by Tick Bites.**—*Acta Dermat.-Ven.* 1920. Dec. No. 3–4. p. 422. [Summarized in *Arch. Dermat. & Syph.* 1921. July. Vol. 4. No. 1. p. 101.]

In this case—a little girl apparently bitten on the nipple—the nipple when seen two months afterwards was enlarged and infiltrated and surrounded at a radius of about four inches by an erythematous ring. There were also some slight and painless nodules in the neighbouring axilla.

A. A.

VAN SACEGHEM (René). **Le traitement du Pyosis tropica au Ruanda.**—*C.R. Soc. Biol.* 1921. Feb. 5. Vol. 84. No. 5. pp. 282–283.

The author has constantly found a staphylococcus in this condition, and an autogenous vaccine administered in increasing doses has proved the best means of treatment.

E. G. G. L.

SIMON (Keith M. B.). **Ainhum, a Family Disease.**—*Jl. Amer. Med. Assoc.* 1921. Feb. 26. Vol. 76. No. 9. p. 590. With 1 text fig.

Keith Simon says that ainhum is fairly common in British Honduras. He reports a case in which the father and mother of the patient were also suffering from the same condition, the toe being lost in all three patients.

E. G. G. L.

KOJIMA (S.) & DO-KIN (Chin). **On Ainhum.**—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1921. Mar. 30. No. 215. English summary pp. 2–3.

The authors report a case in a Chinese male, aged 35, a labourer in the fields, used to walking barefoot. The little toes of both feet were affected.

E. G. G. L.

PARROT (L.). **Sixième observation algérienne de Xeroderma pigmentosum.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 80–81.

Parrot records another case of Xeroderma pigmentosum occurring in Algeria, in the person of a native boy, aged 14, with no family history of the disease. Pigmentation had begun six to seven years previously, and occupied the forehead, ears, neck, chest, abdomen and thighs.

There was atrophy of the skin of the ears, lower eyelids and upper lip, nose, and the nasal and buccal mucosa. Some of the nails were thickened. Dentition was normal. There was a small (?) cystic tumour near the left eye.

E. G. G. L.

DUBREUILH (W.). **Prurigo épidémique chez les asiatiques importée pendant la guerre.**—*Ann. de Dermat. et de Syph.* 1920. 6th Ser. Vol. 1. No. 1. pp. 13–16.

Dubreuilh was able to watch an extensive epidemic of a pruriginous eruption in Annamites admitted to Military Hospital 27 during the war. The affection was at first mistaken for scabies. The eruption consisted of urticarial papules which were much scratched ; it occupied the lower part of the trunk, and especially the lumbar region, but would invade the whole body except the face, hands, feet and genitals ; and as a rule the flexures. There was usually some pigmentation left when the rash disappeared. Glandular enlargements were severe and frequent. The most careful search for parasites was unsuccessful. The condition did not seem to be infectious. The treatment which succeeded best was the application of an ointment : Sulph. precip. 10 gr., Vegetable tar 10 gr., Lard 100 gr., combined with a daily bath.

E. G. G. L.

PINOY (E.). **Traitement de la pelade et considérations sur son étiologie.** —*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 280–281.

Pinoy, without producing any evidence for his opinion, regards Alopecia areata as a parasitic disease and claims to have succeeded in producing excellent results with local antiseptic treatment.

E. G. G. L.

DECROP & SALLE. **Observation de mycosis fongoïde chez un indigène marocain.**—*Bull. Soc. française de Dermat. et de Syph.* 1921. No. 4. pp. 148–149.

Decrop and Salle describe a case of this rare dermatosis in a male native, aged 50. The affection began with the characteristic erythematous rash attended by intense itching, and later tumours developed and generalized infiltration of the skin. Blood counts showed a normal leucocytic formula but a larger number of transitional forms. The patient was treated with injections of N.A.B., but was soon lost sight of.

E. G. G. L.

CHALMERS (Albert J.) & GIBBON (E.). **The Keratosis pilaris of Jackson and Brocq in the Anglo-Egyptian Sudan.** *Jl. Trop. Med. & Hyg.* 1921. May 2. Vol. 24. No. 9. pp. 121–126. With 3 plates.

The authors describe two cases of a follicular keratosis as difficult to classify, from the description, as the follicular eruptions are notoriously difficult of differentiation. The second case is said to have been "rapidly cured under tonic treatment," a fact which almost certainly removes it from the category of Keratosis pilaris, which is a synonym for a variety of Icthyosis and is very little influenced by treatment.

E. G. G. L.

i. CHALMERS (Albert J.) & MACDONALD (Norman). **Some Cosmopolitan Sudan Skin Affections.**—*Jl. Trop. Med. & Hyg.* 1920. June 15. Vol. 23. No. 12. pp. 150–152. With 1 plate.

ii. —— & ——. **Some Cosmopolitan Sudan Skin Affections. II. Molluscum contagiosum. III. Cheilitis exfoliativa. IV. Melanosis lingualis.**—*Ibid.* 1921. Mar. 15. Vol. 24. No. 6. pp. 69–74. With 2 plates.

i. The paper describes two cases of Herpes iris in dark-skinned patients, with a somewhat unusual distribution, viz., on the forehead, in the first case, but otherwise without special interest.

ii. The authors have made a careful study of two cases of Molluscum contagiosum occurring in black-skinned patients, but have failed to make any new contribution to our knowledge of the disease. They regard Cheilitis exfoliativa as being "far from rare" in the Sudan, and found reason, in the case recorded, to ascribe its causation to seborrhoea. Under the not too happy title of Melanosis lingualis they describe a condition commonly met with in natives, a granular hyperpigmentation of the tongue, which can hardly be regarded as pathological.

E. G. G. L.

CHATTERJI (Karuna K.) & CHARUBRATA RAY. **Observations on Margosic Acid and its Salts and their Use in Cases of Syphilis and Skin Diseases.**—*Indian Jl. Med. Res.* 1918. Apr. Vol. 5. No. 4. pp. 655–674. With 3 plates. [Received Feb., 1920.]

Margosic acid and its salts are derived from the margosa tree, the Bengali Nim, the Hindu Nimb. The drug has been in use in India from the earliest times. Careful chemical and biological tests were carried out by the authors. A very bitter alkaloid was obtained by alcoholic extract from Nim oil, from which margosic acid is prepared. Sodium and potassium margosate are soluble salts. They proved useful in the treatment of syphilides, and in the few cases of scabies, eczema, "pemphigus" and psoriasis in which they were tried by the authors.

E. G. G. L.

BOOK REVIEWS.

VON PROWAZEK (S.) [the late]. **Taschenbuch der mikroskopischen Technik der Protistenuntersuchung. 3te. Auflage, vollständing neu bearbeitet von Dr. V. Jollos.** 96 pp. 1922. Leipzig: Johann Ambrosius Barth. [Price Mk. 18.]

The third edition of this little pocket-book, originally devised by the late S. von Prowazek for the use, primarily, of medical men, has been completely revised and re-edited by V. Jollos. In his preface the present editor says that, in addition to the requirements of medical men, those of zoologists have now been taken into account, particularly as regards the technique requisite in connexion with the free-living Protozoa. More attention has been paid, also, to the methods of cultivation in view of the growing importance of this branch of the subject.

The plan adopted is to give, first, a short, general introduction to microscopical technique and the making of observations on the living forms, followed by a selection of the more important methods of fixation and staining. The body of the work is occupied by a consideration of suitable methods for the various classes and groups, treated *seriatim*. While this plan has certain obvious advantages, it involves, unavoidably, an undue amount of repetition and the necessity for much cross-reference. Thus, to give one instance, the method of fixation by the vapour of osmic acid plus a few drops of acetic acid is most valuable for preserving Trypanosomes in blood-smears in what is most nearly their correct size and form, but beyond a brief mention of the use of 2 per cent. osmic acid (p. 45), the method is not fully described until Appendix 1, p. 82; even then the mode of procedure recommended is by no means the best to follow in making use of this method. The Protista, apart from the Protozoa, are dealt with in two appendices, the first of which treats of the Spirochaetes, the other of the "Chlamydozoa," etc.

Naturally, it cannot be expected that a small manual should be in any respect exhaustive of its subject, but it is strange that there is no mention of Leishman's stain, which is so well known for its value as a rapid method for combined fixation and staining of blood-parasites. And another omission that ought to be rectified in a future edition is that of any reference to Twort's stain, which is of considerable service, both for Amoebae and blood-parasites.

The subject of the literature is poorly and unequally handled. For no particular reason that we can discover, some of the references are given in the text, others in short lists appended to the various groups. To judge from those that are given it might be imagined that nearly all the important work on this subject had been done in Germany. We are surprised to find no reference, for instance, to the standard paper on Trypanosome cytology in relation to technique which was published by the late Prof. E. A. MINCHIN.

We cannot say that we have found the book easy or attractive to read; its study would have been greatly facilitated by the insertion of many more cross-headings, in more conspicuous type, to distinguish between the different subsections, such as manipulation, fixation and staining. But the little volume contains a quantity of useful information compressed within its limits and should prove of assistance to those who readily read German.

H. M. Woodcock.

HEWLETT (R. Tanner) [M.D., F.R.C.P., D.P.H., Professor of Bacteriology, University of London] and NANKIVELL (A. T.) [M.D. (Lond.), D.P.H. (Camb.), Medical Officer of Health and School Medical Officer of the Borough of Poole]. **The Principles of Preventive Medicine.**—pp. 512. With 12 charts and 5 diagrams in the text and 3 appendices. 1921. London: J. & A. Churchill. [Price 18s. net.]

In a manual of about 500 pages Professor Tanner Hewlett and Dr. Nankivell have embodied a very large amount of information on public

health work. Although entitled "The Principles of Preventive Medicine" the book contains useful advice regarding the putting of these principles into practice, as well as concrete examples of various public health activities in this country—see, for instance, the sections on "The public health service in relation to the general practitioner" and "Arrangements for dealing with special cases" in Chapter II, "The prevention of infant mortality," Chapter IV, and "The control of smallpox," Chapter XV, and of diphtheria, Chapter XVII. Though the book is based upon English experience, yet, as an up-to-date exposition of preventive medicine as practised in a highly civilized and industrial country, it is nevertheless of considerable value to workers in tropical countries, both medical and lay, not only as furnishing ideals to be aimed at, but also as demonstrating the value of the practical application of measures the principles of which are the same all the world over. Moreover there are many large towns and cities in the tropics in which even the most advanced measures here described might be carried out with advantage. Although the chapter (Chapter II) on the outline of English Local Government might not at first sight appear to have any special interest for medical men in the tropics, it will, it is believed, be of great use to such as are called upon to give advice upon the organization of public health work, either *ab initio* or in its later developments; for it traces in outline public health organization in England from its beginnings in the parish to its culmination in the Ministry of Health, and it may safely be said that, with proper regard to local conditions, no better model than our English system can be found upon which to base public health administration in any part of the world. The great value of such a model to workers in countries where sanitation is less advanced than here is that it represents a system which has been gradually evolved from small beginnings and has been at every point the object of careful study and vigorous criticism. The chapters dealing with Eugenics, Maternity, the Care of Infants and Childhood, and the Health of Adolescents and Adults may perhaps seem caviare to many workers in the tropics, but there will also probably be many who will be glad to gather from them hints, for example, on the establishment of maternity centres or on the organization of the medical inspection of school children.

It is of course necessary in a manual concerned with preventive medicine as a whole to include chapters dealing with building sites, dwelling-houses, and the housing problem generally. It is, however, refreshing to one familiar with the older text-books on hygiene and public health, which were largely concerned with such subjects as the velocity of air currents, the hydraulic mean depth of sewers, and the construction of water closets, to find that the authors of this manual have realized that such subjects are better dealt with by architects and engineers, and have referred their readers desiring to learn practical details of house drainage to plumbers. To say this is in no way to disparage the earlier writers, who were pioneers in days when it was necessary for medical men to explain in some detail matters which may now be left to the sanitary engineer.

The chapter on "Water Supply and Public Health," in spite of the importanee which the authors rightly attach to this subject, is somewhat disappointing. It is true that this is a subject with which the engineer is largely concerned, but more might have been expected in a book of this kind on the examination of water, both chemical and bacteriological, especially as regards its interpretation, and on the safeguarding and purification of water supplies. It is satisfactory, however, to observe the opinion that "in a properly chlorinated town supply *B. coli* should never be discoverable"; the same, of course, applies to any chlorinated supply for human consumption. The advice that before deciding to condemn a water on chemical or bacteriological grounds several samples should be taken and local circumstances investigated is very sound, as is also that on the routine examination of water supplies as a practical check on the efficacy of the methods used for their purification.

An interesting account of the "germ theory" of disease is given in Chapter XIV, which also deals in brief though instructive outline with

epidemiology, immunity, and the diseases and parasites of lower animals communicable to man. Some brief reference is also made here to the measures for preventing such infections. Chapter XV deals in more detail with certain diseases, and the parts relating to smallpox and typhus fever are likely to be of special interest to medical men in the tropics. Sound advice is given with regard to the prevention of smallpox, the paramount importance of vaccination and revaccination and their application to all possible contacts being rightly insisted upon. No mention, however, is made of alastrim or of the greater virulence of the Eastern than of the Western strain of smallpox, nor among the measures for dealing with an outbreak of smallpox is there any reference to the compulsory notification of chicken-pox. The remarks on typhoid fever, although they are stated to apply to infections with the paratyphoid A and B organisms, contain but slight reference to them. No mention is made, for instance, of the fact, which is of considerable importance from an epidemiological point of view, that infection with *B. paratyphosus* A, though common in the East, is but rarely met with in this country, nor of the usually milder course of illness resulting from paratyphoid infections. The speculation as to the possible transmutation of *B. coli* into *B. typhosus*, although interesting, is somewhat in advance of present knowledge. Chapter XVI deals with Tuberculosis and Venereal Disease, the latter common to all parts of the world, and the former already so wide spread as to render the remark that "Tuberculosis may become one of the problems of the tropics" a very belated prophecy. It is to be feared that many of the measures advanced for the prevention of both of these diseases, however admirable they may be in themselves, require a higher individual regard for the public health than is as yet noticeable among the inhabitants of most tropical countries.

A short though useful and up-to-date account of the methods of producing artificial immunity is given in Chapter XVIII, and the elements of vital statistics are ably presented in Chapter XXI.

E. Wilkinson.

BECK (Conrad). **The Microscope. A Simple Handbook.**—144 pp. With 131 text figs. First Edition. 1921. London: R. & J. Beck, Ltd., 68, Cornhill, E.C. [Price 2*s.* 6*d.* net.]

A small handbook on the microscope, which, although quite elementary, deals with many practical points that beginners are apt to ignore. Mr. Conrad Beck describes, in simple language, the various parts of the microscope. The account which he gives of the substage condenser, and of the different forms of illuminating apparatus, is very clear and instructive; it includes a good description of the "Pointolite" lamp, and some references to the employment of colour-screens. Chapter V, which deals with object-glasses and eyepieces, contains matter which is often imperfectly understood, even by those who have used a microscope for some time; it is well, for instance, to emphasize, as Mr. Beck has done, the importance of adjusting the tube-length accurately to that for which the lenses are designed, and to point out the influence of the thickness of the cover-glass upon the performance of the objective. Brief descriptions are given of most of the microscope-stands, lenses and apparatus manufactured by Messrs. R. and J. Beck. The author has scarcely dealt at all with optical theory; but states in his preface that he hopes, at a later date, to publish a further volume on this subject.

The book is well printed, and the price is moderate.

H. J. Walton.